Lindbergh Systems

OMNITERM
General Purpose Intelligent Terminal
For TRS-80 Model I or III with 32K, 1 Disk
RS-232 Board or Microconnection Modem

User's Manual
Release 3
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Lindbergh Systems

OMNITERM Intelligent Terminal - S/N CEOIIELIB
Version 1.53 Release 11
TRS-80 Model I/III with 32K memory & 1 Disk
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While every precaution has been taken in the preparation of this manual, David J. Lindbergh assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein.

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This manual, Release 3 of the OMNITERM User's Manual, describes version 1.52, release 10 of the OMNITERM software. All information is based on this version, and may change with future versions of the OMNITERM software. Future versions will include addendums to this manual describing changes made since version 1.52. If you have a version of OMNITERM later than 1.52, be sure you first read this manual, and then any addendums for your particular version.

This manual was produced on a TRS-80 Model III computer, Radio Shack Daisy Wheel II printer, and the FORTHWRITE word processing system by Miller Microcomputer Services (MMS). In addition to offering our own products such as OMNITERM, Lindbergh Systems is a MMS dealer, and offers the FORTHWRITE package, along with other MMS products. At Lindbergh Systems, we sell only the very best of what we use ourselves.

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Introduction

OMNITERM is an extremely flexible and powerful terminal program for the TRS-80 microcomputer. It will allow you to use your TRS-80 to communicate with almost any type of computer hardware with speed and efficiency. OMNITERM allows your TRS-80 to automatically do all the translation necessary when connected to other computers, as well as giving you a wealth of local functions that ease your use of the system. With OMNITERM you get a true Break key, cassette port "beep" and graphic bell on control-G, a repeat key, buffered printer, the ability to see text that has scrolled off the top of the screen, one key auto signon, lowercase support, file transfer including prompted output and XON/XOFF code recognition, direct X/Y cursor addressing and screen control functions, error count displays, full status display of all functions and much more.

We recommend that you read through this manual once quickly, then sit down with the computer and use each of OMNITERM's functions as they are described. This way, you will have an idea of what is going on as you read through the manual a second time.

If you encounter any unfamiliar terms or concepts, it is a good idea to refer to the Glossary in the back of this manual, rather than plowing through a description of something using words you don't understand. This manual assumes a certain level of technical sophistication, but if you are new to computers or to data communications terminology you may find yourself confused. The Glossary is there to help you along.

Any keys on the TRS-80 keyboard other than single letter keys will be designated in this text by enclosing them in greater/less brackets. For example, <BREAK>. Other keys will simply be stated in capital letters with no other marking, such as the A key or the Q key. It is often important to distinguish the letter O from the number zero. If you are at any time confused, note that the letter is printed as O and zero as 0.

```
**********************************************
*                                            *
*              !!! IMPORTANT !!!             *
*                                            *
*    BEFORE YOU DO ANYTHING,  BE SURE YOU    *
*        ----------> BACKUP <----------      *
*    YOUR OMNITERM DISK FIRST!!  YOU WILL    *
*    BE VERY SORRY IF YOU MAKE  A MISTAKE    *
*    AND DESTROY YOUR ONLY COPY!  SO MAKE    *
*    AT LEAST TWO BACKUPS OF OMNITERM AND    *
*    PUT THEM IN A SAFE PLACE!               *
*                                            *
**********************************************
```

System Requirements

OMNITERM runs on a TRS-80 Model I or III computer with a minimum of 32K of RAM and at least one disk drive. It also requires either Radio Shack's RS-232C interface, or a Microconnection "Port 208" type modem as the hardware over which it communicates. OMNITERM will also work with any hardware that is software compatible with the above, such as the Lynx modem which is compatible with the Radio Shack RS-232 board.

OMNITERM is designed to work with any TRSDOS compatible operating system, from TRSDOS 2.0 onward. Since OMNITERM uses only standard DOS calls, it should work with all future operating systems as well. To date, OMNITERM has been tested on TRSDOS 2.0, 2.1, 2.2, 2.3, 3.0 for the Model I, NEWDOS 2.1, NEWDOS-80 Versions 1 and 2, VTOS 3.0, 4.0, LDOS 5.0, DBLDOS, DOSPLUS, ULTRADOS, and TRSDOS 1.1, 1.2, and 1.3 on the TRS-80 Model III. OMNITERM will work correctly with all of these DOSes, although with some of them certain special settings are needed, as described below.

In this manual, you will sometimes see a reference to the <BREAK> key used to leave one mode and go into another. Under some DOSes, notably LDOS or Model III TRSDOS, you may use <BREAK> to stop what you are doing at ANY TIME at all, not just when it is mentioned in the text. If you do not have one of these systems, the <BREAK> key will perform as described.

Getting Started

Model I

The OMNITERM disk as delivered will run on the Model I TRS-80. To run OMNITERM, boot in the disk supplied. When the "DOS READY" prompt appears, type "OMNITERM" and hit the <ENTER> key. This will load OMNITERM and start it running.

Model III

OMNITERM and its utilities are compatible with the TRS-80 Model III computer, as well as the Model I. Since the disk is delivered in Model I single-density form, the disk must first be converted to double density using Model III TRSDOS's CONVERT utility.

You will need at least two disk drives to run CONVERT. If you have only one, you will have to borrow a Model III computer with two drives to do this conversion. Your local Radio Shack should be able to help you here. Once OMNITERM has been converted, you will need only one drive to use it.

When you first get your OMNITERM disk, you should make up a backup of your original Model III TRSDOS disk. This will become your master OMNITERM disk. Boot up your new backup TRSDOS disk and run the CONVERT program by typing CONVERT in response to TRSDOS READY. The program will ask you which drive will be the source drive. Place the original OMNITERM disk in drive 1, and answer the question with 1. CONVERT will then ask you for the destination drive. Type in 0, since your TRSDOS disk is the destination drive. The CONVERT program will then begin copying the files on the original OMNITERM disk to your TRSDOS disk. As it does this it will list the files on the screen one by one. When the CONVERT program finds a file on the OMNITERM disk that is already on your TRSDOS disk, it will stop and ask you if it should convert it. It should stop on files such as FORMAT/CMD, BACKUP/CMD, and BASIC/CMD. You should answer NO to this question, because these are Model I TRSDOS programs that will not work with your Model III. Your Model III TRSDOS already has programs which do the same things as these programs, so you do not need them.

When all the files have been converted to your Model III TRSDOS disk, CONVERT will stop and return you to TRSDOS READY. You should mark your TRSDOS disk "OMNITERM Master Disk - © 1981 David J. Lindbergh", and then back it up. This is your master disk, and you should keep it in a safe place, and only use it to make other disks from. You have now converted the OMNITERM package to double density, and are ready to use it.

Once OMNITERM is running on the Model III, there should only be two differences in operation against the Model I. First, since the Model III RS232 board has no sense switches, OMNITERM cannot read them for default settings. Instead, it will use a standard setting of 300 baud, 7 data bits, 1 stop bit and even parity whenever the sense switches would be read on the Model I. This is the most common setting for communicating with timesharing computer systems.

The second difference is that the Model III never needs a lowercase driver, since this is the normal mode of the Model III. Ignore all references to the Model I lowercase driver if you have a Model III.

Some special modems for the Model III, such as the Lynx, do not require use of the Model III RS-232 board because they have their own software-compatible interfaces that work through the I/O Bus connector on the bottom of the Model III. OMNITERM automatically turns on the Model III I/O bus, so these special modems will work with OMNITERM without the user needing to manually control the I/O bus.

More will be said about these items as this manual goes along, and these items will be clarified if they are not clear at this point.

NEWDOS-80

OMNITERM is compatible with NEWDOS-80, just as it is with all TRSDOS-like TRS-80 operating systems. However, for OMNITERM to operate correctly with NEWDOS-80, the <BREAK> key must be enabled within NEWDOS-80 by setting the NEWDOS-80 system parameter AG equal to Y. This is true for both Version 1 and 2 of NEWDOS-80. As described on page 2-22 of the NEWDOS-80 Version 1 manual:

"If ag=Y, BREAK is considered a normal input key with code = 01. If ag=N, the BREAK key is not considered a normal input key and its occurrence is changed to the key code 00. The state of the BREAK key is set according to option AG at reset and then again everytime the system returns to normal DOS READY."

DOSPLUS

DOSPLUS users should note that the default DOSPLUS printer driver will not work correctly with OMNITERM unless a FORMS (P=66,L=66) command is executed before using OMNITERM. This is because the DOSPLUS printer driver does not correctly indicate when the printer is ready. The exact details of what is required of user or DOS-added printer drivers is explained in the appendix.

Using OMNITERM

When OMNITERM starts up, it will clear the screen and print its introductory message at the top of the screen. On the Model I, OMNITERM will check to see if you have lowercase hardware and, if you do, it will use a lowercase driver.

You are now in OMNITERM's normal mode and you may use your TRS-80 as a dumb terminal by simply typing away at this point.

On the Model I, OMNITERM has read your RS-232 board's switch settings and configured your UART as these settings indicate. OMNITERM is now using all of its default functions and is similar to a dumb terminal. If you want to send characters, just type them and they will be sent out, but not shown on the screen. If characters are received, they will be displayed on the screen. On the Model I, each key will be sent in lowercase unless you press the <SHIFT> key. To send control characters, use the DOWN ARROW key as a CONTROL key. To send an ESCAPE (also known as ALT MODE) use the UP ARROW key. The <CLEAR> key is now functioning as a repeat key. To send a series of the same character, push both the key you want to send and the <CLEAR> key at the same time. The <BREAK> key will generate a true break.

NOTE: Some operating systems, notably LDOS and Model III TRSDOS, have built-in auto repeat features in their keyboard drivers. Since OMNITERM uses the standard keyboard device, this and other features WILL work with OMNITERM. LDOS uses the <CLEAR> key for a special function, so you will want to use the auto repeat instead of the <CLEAR> key for repeats. Also, some operating systems allow you to toggle from an UPPER/lower case keyboard to a lower/UPPER case keyboard by using the <SHIFT>-0 key. If you have this feature, it will work fine. If not, OMNITERM will allow you to use another method to get uppercase without pressing <SHIFT> all the time. This will be described later.

OMNITERM Command Mode

To get at the real power of OMNITERM, you will want to go into OMNITERM command mode. To do this, just press the @ key twice. If you press @ once, nothing will happen. It is only when you press @ a second time, with no other keys between them, that you enter command mode.

When you want to leave command mode, just press the <BREAK> key and you will return to normal mode, with the screen just as you left it before.

When you enter command mode, the information on the screen will be replaced with a somewhat bewildering array of data. What had been on the screen is not lost. When you return to normal mode later, it will reappear so you can see where you were.

The command mode screen you see contains a status display of the major functions of OMNITERM and a summary of the commands available to you in the form known as a menu.

On the bottom left of the screen you see the current UART settings in use. This includes BAUD RATE, number of DATA BITS, number of STOP BITS and PARITY. This is a quick reference telling you how your hardware is configured.

The bottom middle of the screen shows the status of the most important RS-232 input lines. Beside the wires for transmitting and receiving data, there are extra control lines on the RS-232 interface. These lines fall into two types, input lines which report information from the modem or other device connected to your computer, and output lines that affect the device and are set by the TRS-80. At the bottom middle of the command mode screen is a display of the state of the four important input lines, CTS or Clear-To-Send, DSR or Data-Set-Ready, CD or Carrier Detect, and RI or Ring Indicator. Each time you enter the command mode and the command mode screen is printed these lines are read by OMNITERM and printed on the screen as ON or OFF. OMNITERM does not require these lines to be set any particular way (except optionally in the case of CTS, described later) but this can be useful information if your modem or other RS-232 device sets these lines to indicate various conditions. If your RS-232 hardware does not use these lines, then simply ignore them.

The bottom right shows the number of errors of various types that have occured. This will help you in determining the quality of your connection to the other equipment and will give you a hint when something is going wrong. These counts are set to zero when you start up OMNITERM. Below this is a summary of your disk I/O buffer. It shows how many characters are currently stored in it, and how many it can hold in total.

These bottom portions of the screen may be overwritten by some commands that need space to print extra messages. For instance, when saving a file to disk, you will type the file name in this area.

The top portion of the screen has two columns, listing the commands available to you in command mode. The left column shows a single letter, a single-line summary of that command, the word "is:" and a status flag showing you the state of that OMNITERM function. For instance, the top line on the left shows:

```
P PRINTER        is:   OFF
```

This tells you that the printer is currently off. This will be discussed further in a moment. The commands on the left are invoked by typing the appropriate letter. It is not necessary to type <ENTER>. For example, if you press the P key, you will invoke the PRINTER command.

All the commands on the left column affect the status flags in one way or another. The commands on the right column do not directly affect any visible status flags, but otherwise work the same as the left column functions. When you are in command mode, all you have to do to use any function or invoke any command (a "command" and a "function" in OMNITERM are the same thing) is press the key associated with that function. In some cases, this is all that needs to be done, because there is only one possible way to do that command and it is done immediately. In other cases, OMNITERM will ask you for more information before executing the command, such as a value or a filename.

Summary of Command Mode Functions

Key	Command Name	Function
P	PRINTER	Turn printer on and off
R	SCREEN REFORMATTING	Stop words splitting over edge
C	CR SUPPRESSION	Stretch lines to full screen size
L	LF SUPPRESSION	Prevent double spacing of lines
D	DUPLEX	Send typed characters to screen
E	ECHO	Retransmit all received data
G	CR/LF GROUPING	Send LF after every CR
I	INPUT TO BUFFER	Save received data in buffer
O	OUTPUT FROM BUFFER	Send buffered data to interface
X	SYSTEM COMMANDS	Menu of less often used commands
T	CHANGE/EXAMINE TABLES	Review and modify OMNITERM tables
U	CHANGE UART SETTINGS	Reconfigure interface hardware
A	SEND CONTROL-A & QUIT	Trasmit ASCII value of 1 & leave
@	SEND "AT" SYMBOL & QUIT	Transmit @ sign, goto normal mode
B	SCROLL BACK DISPLAY	See text that scrolled off screen
Z	ZERO REAL TIME CLOCK	Set system timer to 00:00:00
F	FILL BUFFER FROM DISK	Load a file into the buffer
S	SAVE BUFFER TO DISK	Write buffer contents to a file

Cofnmand Mode Functions - Left Column

First we will cover the command mode functions down the left hand column of the command mode screen. These all have status flags associated with them that show the current state of each function. You can use these to verify your function settings and any time you want to check on the status of any OMNITERM function you can flip into command mode and check these status flags. From top to bottom, the left hand column functions are:

P PRINTER

OMNITERM allows you to run your line printer at the same time you are communicating over the serial interface, so that you can have a written record of your session. To turn on the printer, just press the P key from command mode and the printer will go ON if it was off. If you want to turn it off again, just press the P key again. You will notice that as you turn it on and off, the status flag for the printer goes from ON to OFF. This is to let you know at all times if your printer is on or not. The default setting for the printer is OFF.

OMNITERM allows the printer to fall behind the screen if it is not fast enough to keep up. OMNITERM can buffer up to 2048 characters of data to the printer before it runs out of room, thus you can use a printer that is slower than your communications. If the printer falls so far behind that OMNITERM's buffer space is filled, you will see the message:

```
*** ERROR --> PRINTER BUFFER FULL
*** PRINTER TURNED OFF
```

The printer will continue to print what was in the print buffer until it is empty, but no new data will go into the print buffer. This will not affect the normal flow of data to the screen or any other function of OMNITERM. If you go to the command mode, you will notice that the printer has been turned OFF. If you wish, you can turn it on again at this point.

R SCREEN REFORMATTING

One of the problems that must be dealt with when using many different computer systems with your TRS-80 is the fact that most of them are not set up for the TRS-80 64 column wide screen. Many are set up for the 80-column standard, others for 40-column Apple or Atari computers and still others for the 32-column VIDEOTEX type units. OMNITERM meets this problem by allowing you to re-format your screen locally in your TRS-80, so that what you see is a nice 64 column style screen, with all lines filled out and no words split halfway over a line.

The SCREEN REFORMATTING function prevents words from being split halfway over a line by checking for spaces and when the cursor gets too close to the end of a line (where the next word might be split over) it displays the space as a carriage return and begins on the next line. OMNITERM will insert this carriage return only on the screen, the printer and disk output will remain just as the data was originally received.

When you press R and invoke the SCREEN REFORMATTING function, you can re-define which screen column OMNITERM will consider to be too close to the edge of the screen. As you press the key, OMNITERM will clear the bottom of the screen and ask you to:

```
Enter your new screen reformat value ==>
```

You simply type in the new value and press <ENTER>. The value may be from 0 to 255, or you may enter OFF. If you enter 0 or OFF, the status display for this function will show "OFF" and screen reformatting will be shut off. If this function is OFF, words will be split whenever they begin too close to the right edge of the screen. You will normally turn this function OFF only when communicating with other TRS-80's or other machines meant for 64-column wide use, such as some bulletin board systems. If you enter a value greater than 255, it will be ignored and the value will not change.

You will notice that the default value for this function is column 54. This would mean that a space (between words) received AFTER COLUMN 54 will be sent to the screen as a carriage return. We have found that 54 is about right for most uses. If you want to allow longer lines, but risk having lines split halfway over the edge (at column 64) you could set a higher reformat value, such as 58 or 60. If you want to be absolutely sure no words get split, set it at 50 or so. Here only words 14 characters or longer will be split, since 50 is 14 less than 64.

C CR SUPPRESSION

This is the other half of OMNITERM's ability to re-format your screen when working with various systems. Imagine that you are using a system that is sending 80-column lines. The R reformatting is preventing the lines from being split by changing some spaces to carriage returns in each line. That same line then continues on the next line of your screen. After two or three more words on your next line, the other system has finished its line, so it sends a carriage return. If OMNITERM processes this carriage return normally, you will see a full line of text followed by one with only two or three words on it. The next line will be full and the one after that will again have only a few words. This looks very sloppy. Here is where the CR SUPPRESSION command comes in.

When CR SUPPRESSION is ON (the default is OFF, explained later) every time a Carriage Return (CR for short) is received, it is translated to a space before going to the screen. This means when that two or three word line is done, the carriage return is shown as a space and the next line sent is shown as a continuation of the previous line. The only exception to this is when two or more CRs are received in a row. Then only the first one is converted to a space, so that a series will properly leave some blank lines on your screen.

Thus, when the cursor nears the end of the line, the R screen reformatting changes one of the spaces between words into a carriage return and your next line starts. This may all seem complicated, but it works rather well. For instance, say some 80-column lines are received with CR SUPPRESSION off:

```
Sparky Snap Crackers are the snappiest snap crackers
you can buy
without the dangerous addition of gunpowder in the
dough.  That's because
they taste soooo good!  You should get some.  Your
children will love
you for it.  No artificial flavorings added.  USDA
approved.  FDA approved.
```

But, with CR SUPPRESSION on:

```
Sparky Snap Crackers are the snappiest snap crackers
you can buy without the dangerous addition of gunpowder
in the dough.  That's because they taste soooo good!
You should get some.  Your children will love you for
it.  No artificial flavorings added.  USDA approved.
FDA approved.
```

That is how those same four lines would look with CR SUPPRESSION turned ON. The large lines have been re-formatted for your screen. This works equally well for expanding short 40 or 32 column lines to your screen size. The carriage returns at the end of each line become spaces and the line continues until it reaches the R value's setting, where the next space does a CR.

As you can see, the CR suppression is not much good without the R reformatting feature. Also, the CR suppression is really only useful when you are looking at large blocks of text. If you are seeing a menu on CompuServe, for instance, which is meant for 32 columns and looks like this:

```
1 Startrek
2 Space War
3 Checkers
4 Chess
5 Hangman
6 Poker
7 Civil War

Choose a number.
!
```

It does you very little good to see that as:

```
1 Startrek 2 Space War 3 Checkers 4 Chess 5 Hangman
6 Poker 7 Civil War Choose a number. !
```

Which is exactly how it would look with CR SUPPRESSION turned ON. For this reason, the default value for this is OFF.

L LF SUPPRESSION

Most computer systems are designed to use the ASCII code which was designed to run Teletype-style mechanisms. Teletypes need two separate codes at the end of each line- first, a CR to move the carriage back to the beginning of the line and then a line feed (LF for short) to move the paper up. The TRS-80 needs only one code to do both these functions and the way the screen driver was written, either of these codes will do both functions. Most computer systems send both a CR and a LF at the end of a line. If OMNITERM were to respond to both, you would get a blank line between each line on your screen. Thus the LF SUPPRESSION function allows OMNITERM to ignore line feeds and only accept the CR'S, so that you will not get a blank line. If you receive more than two LFs in a row, all but the first WILL be accepted, so your screen will scroll when blank lines are sent. If LF SUPPRESSION is turned OFF, all LFs received will be shown normally.

This function must be used with almost every commercial timesharing computer, since even non-Teletype video terminals now act like Teletypes. The default for this function is ON and the only time you are likely to want to change it is when communicating with other microcomputers that use only the CR.

D DUPLEX

The way most timesharing computer systems work is called "full duplex". This means that when you, the user, send a key to the remote computer, you do not see it on your screen immediately. Instead, the character is sent to the far end of the line, processed by the remote computer and only then sent back to you to appear on your screen. This process of sending back characters just received is called echoing back the characters. The main advantage in this is that if there was a transmission error somewhere along the way, you will know about it, since the wrong character will appear on your screen.

The other possibility is called "half duplex". This means when you press a key it is immediately shown on your screen, as well as being sent down the line. The remote computer does not echo it back at all and you must simply assume that it was received correctly. This is common with IBM computers.

The default mode for OMNITERM's DUPLEX function is FULL. This means simply that OMNITERM will not send your keystrokes to the screen, but will only show what is received over the interface. If you wish to speak with a computer that uses half duplex and you are using a modem or acoustic coupler of some sort, first try to use the hardware switch for half duplex on your modem before you use OMNITERM's. Most modems have a switch-activated circit that simply echos back what it receives locally. You should try to use this first and leave OMNITERM in FULL duplex because OMNITERM does some of its functions only on characters received and not those generated locally. You will make things a little clumsier by setting OMNITERM to HALF duplex. But if you have a modem with no such switch or another situation where the remote device will not echo your characters, do not hesitate to put OMNITERM in HALF duplex. The only problem may be that you will occasionally find yourself accidentally causing harmless functions to act and then have to go to the trouble of turning them off again.

NOTE: Half and Full duplex have a different traditional meaning than that used in this context. There is a long story about how this came about, but if you ever hear "Half duplex" to mean "sending one direction at a time" and "Full duplex" to mean "sending both directions at one time", do not be surprised, since this is the original meaning.

E ECHO

The ECHO function is used when your TRS-80 is the computer that must supply the echo to another computer or terminal. When the ECHO function on ON, every character OMNITERM receives is immediately sent back out again. This will allow your TRS-80 to communicate with computers or terminals that can only connect to machines that echo back their data to them. Since most users of OMNITERM will be connecting to a timesharing system that echos to them, ECHO is not needed and the default is OFF.

G CR/LF GROUPING

When you press the <ENTER> key, normally a CR is generated and sent out over the communications line. However, when you are connected to hardware that is meant to connect to timesharing systems, you must send both a CR and a LF to get the device to go to the the next line properly. When the CR/LF GROUPING function is ON, a LF is automatically sent out after all locally generated CRs. The function Groups together LFs with your CRs. This is normally used together with the ECHO function, when your TRS-80 acts as the larger computer for a device like a Teletype, video terminal, or another microcomputer. The default state for this function is OFF, since most timesharing systems do not need this from you.

I INPUT TO BUFFER

The way OMNITERM does file transfers is through a buffer in memory that stores the data to be transfered. This buffer extends from the end of the area OMNITERM uses to the end of your memory as determined by the HIMEM pointer. This means that OMNITERM will not try to write over any high-memory drivers that you may be using, as long as they properly modify the HIMEM pointer value to point below themselves. The size and contents of this buffer is summarized on the bottom right line of the screen in command mode. It might show:

```
Buffer:  7194 of 27644 used
```

This means that the total size of the buffer is 27644 characters (or bytes) in length and that currently 7194 bytes are in use. When the I INPUT TO BUFFER function is ON, every character that is shown on the screen, that is, every byte transmitted or received in half duplex, or received in full, is placed into this buffer. When the INPUT function is OFF, the buffer is unchanged and the data in it simply sits there unaffected.

As you press the I key to activate the INPUT command, different things happen depending on the current state of the function. If it is currently ON, it will simply turn OFF. But if it is OFF, when you press I, the buffer will first be cleared and the display will go to:

```
Buffer:     0 of 13231 used
```

Only then will the INPUT function go on, so that all data will now go into a new, empty buffer. There is also a way to have the remote device automatically open your input buffer and this will be described later.

If the buffer becomes full, the normal screen will show:

```
*** ERROR --> I/O BUFFER FULL
*** INPUT TO BUFFER STOPPED
```

If you now go to the command mode, you will see that the entire buffer is filled and that INPUT TO BUFFER is shown as "OFF". This means that the file you are trying to transfer is too big to do in one chunk. You must first split it into smaller pieces that will fit in your buffer and then send or receive them one at a time.

INPUT TO BUFFER is used mainly when receiving a file from a remote system. The default value for it is OFF. Note that you cannot INPUT and OUTPUT from your buffer at the same time. If you try to turn on INPUT with OUTPUT is already ON, you will not be able to. The same goes for turning OUTPUT on when INPUT is already ON.

O OUTPUT FROM BUFFER

To send a file from your buffer to another machine, you must get the file into your buffer and then use the OUTPUT FROM BUFFER function. This function sends the contents of your buffer out over the interface, just as if you were typing it from the keyboard. The computer on the far end of the line must then receive it and somehow store it. Not all computer systems can keep up with a continuous output of data and will fall behind and lose some if a way of either slowing the output or stopping it until the other computer is ready for more is not used. OMNITERM has three different ways of doing this, which may be used individually, in combination, or not at all.

When you press the O key to invoke the OUTPUT FROM BUFFER command and OUTPUT FROM BUFFER is already ON, OUTPUT FROM BUFFER simply stops and goes to OFF. Your buffer is unaffected and you may re-send the buffer at any time.

If instead you press the O key when OUTPUT FROM BUFFER is OFF, the bottom of the command mode screen will clear and you will see there:

```
Enter time between characters (0 to 255) ->
```

This allows you to specify a fixed time delay that OMNITERM will wait between sending successive characters. You must enter the time delay, where 0 means no delay and 255 is the longest possible. Many timesharing computer systems are set up for someone typing about the speed of a typist and not a computer, so OMNITERM allows you to simply slow things down this way. You may find that values below 50 or so for the delay will seem to make no difference at all at 300 baud. These smaller delay values will only be useful at higher baud rates.

This is the worst method for sending data to a remote computer, since it is so slow. You should only use this when nothing else will work. If you want no delay between characters at all, just press <ENTER> at the question, or give it a value of 0.

Once you have given the time delay, OMNITERM will show:

```
     Enter your prompt string.  If none, just hit <ENTER>.
     Use semicolon (;) where you want a carriage return -->
```

OMNITERM has the ability to do prompted output. This means that OMNITERM can send one line of text from the buffer and then wait for a prompt string to be sent by the remote computer indicating that it is ready to go on. This is done often with IBM computers and bulletin board systems. Usually, but not always, the prompt will be a single character such as a question mark, or a "greater than" symbol. When the remote system sends this prompt string, it means that it is ready to receive another line of text and OMNITERM then sends it.

What you must type in now is the prompt string you want OMNITERM to wait for before each line. If you do not want to use this prompted output, but instead want OMNITERM to transmit data continuously, just press <ENTER> and no prompt string will be used. Otherwise, type in the prompt string, up to 16 characters long. If you want a CR to be part of the prompt string, use a semicolon (;) instead of <ENTER>, since <ENTER> is used to signal the end of the prompt string. You will see now that the status flag for OUTPUT FROM BUFFER is ON and when you press <BREAK> to go back to normal mode OMNITERM will begin sending from the buffer. The third method of pausing output from the buffer will be described later. This default for OMNITERM is, of course, OFF.

When OMNITERM finishes sending the contents of its buffer, it will show on the normal mode screen:

```
                    *** OUTPUT COMPLETE
```

This is simply to let you know that OMNITERM is done sending the buffer. If you want to stop OMNITERM when it is sending data out, you must go into command mode and press O again. This will turn the OUTPUT function OFF.

Command Mode Functions - Right Column

The OMNITERM command mode functions in the right hand column do not have status flags, because they do not control ongoing functions that can be ON, OFF, or have a value to work with continuously. Instead, they are one-time functions that do their job and then finish. You will activate them when you want them and then be done with them. Again from top to bottom, the right hand column functions are:

X SYSTEM COMMANDS

When you press the X key from command mode, the screen will clear and a new menu of system functions will appear. You have entered what is called a sub-menu, since it is a menu within a menu of commands. To leave system mode, press the <BREAK> key and you will return to the command mode.

Some of these system commands have very drastic effects and so they are harder to get at, as you would not want to use them by accident. Others are simply commands that are used only rarely, and need not take up space on the regular command mode menu. The system commands work much like the command mode commands, in that they work when you press the key in front of the description, with no need to press <ENTER>. Also, some have status flags much as in the command mode. The system commands are:

Key	Command Name	Function
Q	QUIT OMNITERM & GO TO DOS	Leave OMNITERM
C	COLD OMNITERM RE-START	Reset all defaults
S	SAVE OMNITERM SETTINGS	Write all settings to disk
L	LOAD OMNITERM SETTINGS	Read settings file from disk
A	AUTO SIGNON MESSAGE CHANGE	Change Auto Signon string
I	RE-OPEN BUFFER FOR INPUT	Add received data to buffer
E	EXAMINE DISK I/O BUFFER	Look at text in disk buffer
R	RTS OUTPUT LINE	Toggle RTS RS-232 output line
D	DTR OUTPUT LINE	Toggle DTR RS-232 output line
W	WAIT FOR CTS	Pause output when CTS is ON
M	MODEM	Change modem interface type
P	DIAL PHONE WITH RTS LINE	Dial telephone with modem

Q QUIT OMNITERM & GO TO DOS

This is your way to leave OMNITERM and return to "DOS READY" level. Simply press the Q key and you will be finished with OMNITERM.

C COLD OMNITERM RE-START

If you press the C key, you will do what is known as a cold start of OMNITERM, which is the same as if you had left OMNITERM and gone to "DOS READY" and then re-run OMNITERM from the start. All flags, settings, etc., are put back to their default values regardless of any changes you may have made. This is used when you have mistakenly changed things, or simply want to start over. Just press the C key and OMNITERM will re-start for you from scratch.

S SAVE OMNITERM SETTINGS

As you have been reading this manual, you may have wondered if you had to setup all these functions for your unique use over and over again each time you load OMNITERM. Every time you wish to communicate with a video terminal, do you have to turn ECHO to ON, CR/LF GROUPING to ON, set the UART to 9600 baud and so on? The answer is of course *NO*. What you can do instead is set OMNITERM up ONCE for your application and then SAVE those settings onto a disk file. Almost everything about OMNITERM that can change is saved on disk when you use the S system command. The appendix gives a full list of what is saved in the file, but it is simply everything you can change within OMNITERM, except such things as the error counts and the contents of the buffer. When you have configured OMNITERM the way you want it, go into system mode and press S. OMNITERM will print:

```
Enter save filespec ===>
```

You must type in the filename you want to save the settings under. It may be any standard TRSDOS filename, including extentions, passwords and drive numbers. When you are done, press the <ENTER> key to indicate the end of the filename.

If you specify no extention, OMNITERM will add on "/OMT" as the default extention. This can be useful, since when loading in settings, OMNITERM will also assume "/OMT" is the extention if you do not give one. If for any reason a disk error occurs while saving your settings (disk full, illegal filename, etc.) OMNITERM will print the DOS error message and wait for you to press any key. It will then clear the screen and you will remain in system mode to try again. After a successful save, you will be in command mode.

You can have many different setting files for OMNITERM, each for use with a different computer. You may, for instance, have one called CPM/OMT, for use with a CP/M computer, or one called PRIME/OMT, for use with a Prime minicomputer. There are two ways of loading in these settings once you have saved them. The first is with the L LOAD OMNITERM SETTINGS command described below. The other is when you first enter OMNITERM from "DOS READY" level. If you simply add the name of the file on the same line as OMNITERM, that file will automatically be loaded in by OMNITERM, so that you will never see the default OMNITERM. Instead, as soon as OMNITERM starts, it will be configured with your settings. So from "DOS READY" you could say:

```
OMNITERM IBM
```

to use OMNITERM with the settings for an IBM computer stored in a file called IBM/OMT, or you could say:

```
OMNITERM APPLE
```

to use OMNITERM with the settings for an Apple computer stored in a file called APPLE/OMT.

L LOAD OMNITERM SETTINGS

Once you are already in OMNITERM, you may wish to load in a different set of settings from disk than the one you started with. Press L in system mode to do this. OMNITERM will show:

```
Enter load filespec ===>
```

You must type the name of the setting file you wish to load. As before, it can be a standard TRSDOS file specification, with extention, password and drive number. If you omit the extention, OMNITERM will assume "/OMT" for it. When the settings are loaded, you will return to command mode. If for any reason a disk error occurs while loading the file (file not found, etc.), the error message from DOS will be printed and OMNITERM will wait for you to press any key before going on. After you press the key, the screen will clear and you will still be in system mode so you can try again.

A AUTO SIGNON MESSAGE CHANGE

OMNITERM has the ability to allow you to store a series of characters to be used as an auto signon string. This is your normal sign-on sequence that you use to log on to a computer. You can store it here once, save it in the settings file and every time you need it, press the control-0 key to send it. The Auto signon string can also be sent out automatically on request from a remote computer system. By default, each time OMNITERM receives an ASCII 5, ENQ, it will send out the Auto signon string.

The default auto-signon is nothing at all, so to change it you must press the A key in system mode. OMNITERM will show:

```
Enter your new signon message below:
Use a semicolon (;) where you want a carriage return and
apostrophe (') where you want a pause.
>
```

You may now type in your auto-signon message. It may be up to 63 characters in length and if you want carriage returns in it, use semicolon (;) instead, since <ENTER> signifies the end of the message. The semicolon will be changed to a carriage return.

You can also place PAUSES in your auto-signon message. Some computer systems do not have type-ahead or cannot take the sign-on procedure at full speed. You can insert pauses to fix this.

When typing in your message, simply insert an apostrophe (') whenever you want a pause. Each apostrophe will print on the screen as (PAUSE) and will cause a pause of about 1/2 second during output. If you need a longer pause, just type several apostrophes in a line. Thus four would cause a pause of about two seconds.

A sample signon message for the Source using Telenet, for example might be:

```
DECWRIII;''C 301 24;''ID TCA000 PASSWORD;
```

as ty)ed, which would show and be sent as:

```
DECWRIII
(PAUSE)(PAUSE)C 301 24
(PAUSE)(PAUSE)ID TCA000 PASSWORD
```

This is three seperate lines all of which will be sent automatically when you press control-0 in normal mode.

When OMNITERM sends the auto-signon string, it will not display it on the screen. OMNITERM automatically stops displaying incoming data as it sends out the auto-signon string. This is so that bystanders will not see your password. This feature gives you double protection, since nearby people cannot see you type the keys of your password, and cannot see it on the screen either.

Some computer systems with which you may use OMNITERM will echo back the auto-signon string some time after OMNITERM has sent it out. This could cause only the last few characters of the auto-signon string to be shown on your screen. Do not be alarmed if this happens. OMNITERM has still sent out the entire string, and it should work normally.

The text of the auto-signon string message is put through the FROM Disk Buffer table (described later) before being sent out. This table was chosen because the auto-signon was not felt to be important enough to merit a table of its own, although it did need to go through some table. The FROM Disk Buffer table was chosen because the auto-signon string's function is closest to that of outputting text from the disk I/O buffer, and thus it should use the same table. This information could be important if you wish to send characters that cannot be put in the auto-signon string, since you could translate other characters to the desired ones, as described below.

If you have trouble using the auto-signon feature it may help to know that most problems fall into one of two catagories.

The first and most common problem is that you have entered an auto-signon string you believe should work, and it does not. Usually what happens is the remote computer system accepts the first part of the auto-signon string, and refuses to accept the rest. This problem is caused by an auto-signon string that is either incorrect, or one with insufficient pauses. It should be emphasized that all the auto-signon function does is send out data in the exact same way that you do when you press keys. IF IT WORKS WHEN YOU PRESS KEYS, IT WILL WORK WITH THE AUTO-SIGNON STRING. This is necessarily true, since the only difference between keystrokes and the auto-signon function is timing, and you can control this with pauses.

Before making up an auto-signon string, you should therefore be very familiar with how you would sign-on the system manually. It is important not to forget about carriage returns, which must be specified as semicolons (;) in the auto-signon string. One good technique for assuring that no keystrokes are forgotten when making up the auto-signon string is to first make up a list of keys by signing on to the system by hand, and as each keystroke is made, writing it down on paper.

Once you have the correct sequence in the auto-signon string, most of the time the auto-signon string will work as-is. In most cases the need for pauses is minimal, and they can usually safely be left out altogether. If this is done, it is important to wait several seconds after sending the auto-signon string for a response, because many remote computer systems, especially the large networks such as Tymnet and Telenet, take a certain amount of time to respond to each sequence. If you become impatient with this and type needless extra information, you can cause extra problems.

If you follow the above and, after double-checking the accuracy of your auto-signon string, you still cannot get the remote system to accept your commands, then is the time to experiment with adding pauses.

The importance of experimentation cannot be over-emphasized. The auto-signon CAN be made to work, but you must be willing to experiment until you find your own mistake or until you find the proper combination of pauses for the system you are working with.

The second common problem with the auto-signon string is that the user sometimes needs to send characters with the auto-signon string that cannot be typed into it. This can be solved using OMNITERM's translation tables, described later.

The code that control-0 generates by default is an ASCII 5, or ENQ. This byte is often used by other computers systems as a "who-are-you" character to request the caller to identify himself. OMNITERM will respond to this by acting as if you had pressed control-0, automatically sending your auto-signon string. This should make it easier to sign on to systems supporting the ENQ code.

I RE-OPEN BUFFER FOR INPUT

This allows you to re-open the input buffer without clearing out the current contents.

This would be used when some data has already been received and the buffer closed, but you later wish to put more data into the buffer before saving it to disk. The I RE-OPEN BUFFER FOR INPUT function cannot be used, since it clears the buffer contents each time. Instead, use I RE-OPEN BUFFER FOR INPUT. As you press R, you will return to command mode and you will note that I RE-OPEN BUFFER FOR INPUT is now ON. The buffer size and contents are unchanged.

E EXAMINE DISK I/O BUFFER

This lets you examine text you have received with OMNITERM before saving it to disk to make sure it is correct. Just press the E key from system mode, and the screen will clear. At the top of the display you will see the message:

```
Hit SPACE to see text, <BREAK> to quit, or <ENTER> to restart
```

This means about what it says. To examine the text, hold down the space bar. As long as you hold it, the text will print on the screen. When you let go, it will stop until you press it again. If at any time you want to start with the text in the buffer from the beginning again, press the <ENTER> key and you will start over. If you see a large horizontal graphic bar go across the screen, you have reached the end of the text in the buffer. The output will stop until you let go of the space bar and press it again. The text will then start over from the beginning. To go back to system mode, just press <BREAK> at any time.

R RTS OUTPUT LINE

In addition to the RS-232 input lines described earlier, there are two RS-232 output lines set by the TRS-80 that can control RS-232 devices. This command lets you control the RTS, or Request-To-Send RS-232 output line. When in the system mode the current setting of the RTS line, ON or OFF, is shown next to the command. By default, this is ON for RTS, which is the correct setting for most modems. To change it, just press the R key. You will see the change on the system command mode screen. Some RS-232 devices such as modems require the RTS line (or DTR line, described below) to be set a particular way in order to work or to perform a special function. This is why you might want to change the setting of the RTS line. The status of the RTS line, like all other settings, can be saved as part of a /OMT setting file.

D DTR OUTPUT LINE

This is exactly like the R RTS OUTPUT LINE just described, except that it controls the Data-Terminal-Ready, or DTR output line. By default it is OFF, the correct setting for most modems. To change it, just press the D key, and the change will be shown on the screen.

W WAIT FOR CTS

When this function is turned ON (it is by default OFF) OMNITERM will not output anything from the disk I/O buffer while the CTS (Clear-To-Send) input line on the RS-232 port is ON. Instead, OMNITERM will wait for the CTS line to go OFF. Anytime the CTS line is ON OMNITERM will pause, and when it goes OFF again OMNITERM will continue. Some types of RS-232 hardware use this method to indicate when they want transmission to pause.

M MODEM

Beside this system command will appear the current modem interface used by OMNITERM. This can be one of two values, RS-232, meaning the standard Radio Shack RS-232 interface board (or other hardware which is software-compatible with the Radio Shack board), or MICRO, meaning the Port 208 version of the Microconnection. This value is set each time OMNITERM is started. If a Port 208 type Microconnection is connected to the TRS-80 and has been turned on prior to OMNITERM being started, this value will be set to MICRO, and the Port 208 Microconnection will be used. Otherwise, the regular RS-232 board is used.

Each time the M key is depressed in system command mode to execute the M MODEM command, the modem type (as shown next to the M MODEM command) will change. This is how you can change the modem type you wish to use without restarting OMNITERM. This would be useful if you have both types of hardware on your TRS-80 and wish to switch between them. More often, since most people only have one type of modem, you might want to use an OMNITERM setting file that was created for use with the other type of interface. Since modem type is saved as part of an OMNITERM setting file, your modem type could be set for the wrong type of interface. You would then use the M MODEM command to change this to be correct for your hardware.

Please note that all the sample OMNITERM setting files supplied on the disk use the standard RS-232 interface, and that Port 208 Microconnection users must use the M MODEM command before these files will work with their Modem.

Other differences when using the Port 208 Microconnection modem are that the baud rate is always fixed at 300 baud, and that only the DSR line, of the four lines shown on the command mode screen, is active. This is because only DSR is detected by the Microconnection hardware. Otherwise operation is the same as with the regular Radio Shack RS-232 board.

P DIAL PHONE WITH RTS LINE

This is used to enable the Microconnection modem equipped with the Auto-dial feature to dial the telephone. It can also be used to dial the phone with any other modem that uses the same phone dialing technique. With this feature, you do not even need a telephone to call out with the Microconnection and OMNITERM. To use it, just press the P key in system command mode. OMNITERM will show on the bottom of the screen:

```
Enter number to dial ===>
```

Simply type in the number you wish to dial. Other characters besides numbers (such as (,), -, spaces, etc.), can be typed. OMNITERM will simply ignore them and only the digits will be dialed. Before pressing the <ENTER> key to start OMNITERM dialing, push in the Voice/Data switch on the Microconnection to make it pick up the phone electronically. Wait a second or two to let the phone system start a dial tone. If you have a telephone nearby you can pick it up and listen for the dial tone, but put it back down before continuing. Then press <ENTER> and OMNITERM will dial the number. You should see the light on the Microconnection flash as it does this. After OMNITERM has dialed the number, it will return to command mode, and you can press <BREAK> to go to normal mode, or simply wait. After a few seconds the carrier light on the modem should light up when the computer on the other end answers. If it does not, there has been a problem such as a busy signal, no answer, etc. If you have a phone nearby you can pick it up to listen in order to determine the problem.

To leave system command mode, simply press the <BREAK> key and you will return to command mode. These are all the system commands and now we continue with the command mode right-hand column functions.

T CHANGE/EXAMINE TABLES

One of the most powerful features of OMNITERM is its ability to translate a byte to or from any device to any other byte. OMNITERM uses as its devices the display screen, the communications, or comm line, the disk file buffer and the printer. The T function in command mode allows you to examine and modify seven byte translation tables, one for each possible device and one for each direction, input FROM a device, or output TO a device. You can also examine and modify the Control Key table and the Special Command table.

Translation Tables

The purpose of the translation tables is to allow you to translate any byte to or from a particular device to any other byte. This can be used for code conversions, or it can be used for customizing OMNITERM to work with various hardware.

Your TRS-80 uses what is known as the ASCII character set. This stands for American Standard Code for Information Interchange. Although this code is the most popular by far, it is not the only code in existence. IBM computers use a code called EBCDIC, Extended Binary Coded Decimal Interchange Code. If you are, for instance, connected to a printer built for an IBM computer, you must translate all the ASCII bytes into EBCDIC before sending them to the printer. This can be done by changing the TO PRINTER table so that each ASCII code is translated to its equivalant EBCDIC code. You will find tables of both codes in the Appendix.

Since the majority of computer systems use the ASCII code, you will not be doing many code conversions with OMNITERM's translation tables. More often they will be used for customizing OMNITERM to specific hardware and to your taste. For example, the normal way to stop something on the TRS-80 is to press the <BREAK> key. OMNITERM tries to support this, since its default use of the <BREAK> key is to send a true Break, done through the special command table, described below. But the TRS-80 internal routines generate a value of 1 when the <BREAK> key is depressed. You may find a computer system that does not like true Breaks and instead wants a control character to get its attention. This is often a control-C or a control-P. Of course, you could simply send the control character to stop it, but this can be clumsy if you are already used to using the <BREAK> key. The solution is to use the FROM KEYBOARD table and translate the value 1 to the control character. This way, whenever you press the <BREAK> key, the control character will be sent instead.

This is how all the translation tables work. Another possible use is translating or masking out unwanted control characters. If a computer system sends control codes that make your ·printer do unwanted things, such as underlining, wide printing, or beeping, you could change these characters to nulls (ASCII 0) in the TO Printer table. Or, if you wanted a received disk file to go into the Electric Pencil with the CR's converted to spaces, you would simply change the value for CR to the value for space in the TO Disk Buffer table.

Control Key Table

Control characters and other special characters not on the TRS-80 keyboard are generated through use of the OMNITERM control key, or down arrow key. When the control key is pressed with another key on the keyboard, the character is first sent through the FROM Keyboard table. The character so far is unchanged by the control key. Next, the character is sent through the Control Key table if the control key is held down. This table, by default, translates both upper and lowercase characters to the proper control code. Also by default it translates the digits 0-9 to special characters not on the TRS-80 keyboard, such as square brackets, broken bar, etc. The Appendix lists all of these.

If you want other special characters of your own to be sent with the control key, you can add new values to the Control Key table. For example, to send an ASCII ENQ code by pressing control-? you would change position 63 in the Control Key table to 5, since the ASCII value of ? is 63, and the code for ENQ is 5. Other changes could be made in a similar manner.

Special Command Table

OMNITERM has many functions that are done only when a particular byte comes from a particular device. For example, when you press the <BREAK> key, the value of 1 (control-A) is generated. Rather than the 1 being sent, a true Break occurs. As another example, when a control-G character (the ASCII code for ring the BELL) is received, a picture of a large bell will flash on the screen and you will hear a "beep" sound come through the cassette port (if it is wired correctly).

Both these functions, and many others described later in this manual, are handled by the SPECIAL COMMAND TABLE. This table is a list of all possible bytes. Each time a byte comes in from any device, the table entry for that byte is checked. If the value there is a 0, nothing unusual happens. But, if any other value is found there, the special command with that number is executed. For example, the special command number for the BELL function is 2. The ASCII code for control-G is 7, so the seventh entry in the special command table is 2. Thus every time a control-G is received, special command 2 is executed. If instead a 1 were there, a true Break would be sent, since 1 is the special command number for the Break function. If a 0 were there, nothing would happen.

If that value of 2, the special command number for the Bell function, were instead (or also) placed in special command table entry number 65, every time a capital A was received the Bell function would occur, since 65 is the ASCII code for A.

You can place any value in any spot in the special command table, so you can have the same function occur on any of a number of different bytes, or you can replace one function with another, or delete a function altogether.

Note that since OMNITERM checks the Special Command table only when a byte first comes in from a device, it cannot execute different special command functions based on what byte a TO translation table translates it to. OMNITERM can only do a special command on a byte as it comes in from a device, having only passed through the FROM translation table.

This is the how all the special commands work. There is a list of thirty of them later in this manual and they comprise some of the more powerful features of OMNITERM. If you can learn to use them they can make OMNITERM much more useful to you and since like all tables, they are saved in the OMNITERM setting file, you can use them to customize OMNITERM for each application.

Examining and Modifying Tables

You can look at and change the contents of any table by using the T key from command mode and selecting the number of the table you want to examine or alter. The screen will clear and you will see a list of the tables, numbered from one to nine. All the tables work essentially the same way when you want to access them. You choose one of the tables by pressing the digit from 1 to 9 that corresponds to the number of the table you want to access. There is no need to press the <ENTER> key. The screen will clear and you will see a message telling you to "Hit <BREAK> to quit", the name of the table you are looking at, a table of 64 numbers in Hex and their entries also in Hex and a message:

```
 Hit - for previous page, +/; for next, <ENTER> to alter value
```

What you are seeing is the normal table display. This is a table of 64 of the total 256 possible bytes, all at once on the screen. There are four pages to each table, one for the bytes 0 to 63, one for 64 to 127, one for 128 to 191 and one for 192 to 255. When you first enter a table, you see the first page, for bytes 0 to 63 (00 to 3F in Hex). As the summary line describes, you may see the previous page by pressing the - key and the next higher one with the + key, which also has semicolon on it, but the <SHIFT> should not be pressed.

The way the table is set up, bytes enter on the left side of the = and the value for that entry is on the right side. A good table to look at for example is the "Control Key" table, which is table number 9.

Here you will see the special characters defined by default on the bottom two rows of data on the screen. The 1 key, which has a decimal value of 49 and a Hex value of '31', is translated to a Hex '7C', which is 124 decimal, the ASCII code for broken bar. Thus when you press control-1, the byte of 49 will be generated by the TRS-80, which is then translated to 124, broken bar. If you wanted the control-1 to send a different value, you could change the byte of '7C' Hex to whatever else you wanted. Most bytes in translation tables are not translated by default, so you will see many bytes with the same Hex value on both sides of the equal sign. To make bytes that ARE altered stand out, you will see small graphic bars on each side of a translation table byte that IS altered. Since most bytes in the special command table are zero, you will see bars there around bytes that are not zero.

If you want to change a table entry, press the <ENTER> key. You will see:

```
          Enter byte to alter (add H for Hex)    -->
```

Type in the byte on the left of the equal sign you wish to alter. If you type it in Hex, place an H on the end of the number before pressing <ENTER>. If you type it in decimal, simply press <ENTER> when you are done. OMNITERM will respond:

```
          That byte is currently (in decimal)    --> ###
          Enter your new value (add H for hex)   -->
```

The ### will be the old decimal value of the byte you have selected. Since you may have entered your selection in decimal and now know its old value, you need not use Hex at all. If you just wanted the current decimal value, you can now press <ENTER> and nothing will change. To enter the new value, just type it in Hex or decimal and press <ENTER>. If you typed it in Hex, be sure to place the H after it so OMNITERM will know it is Hex.

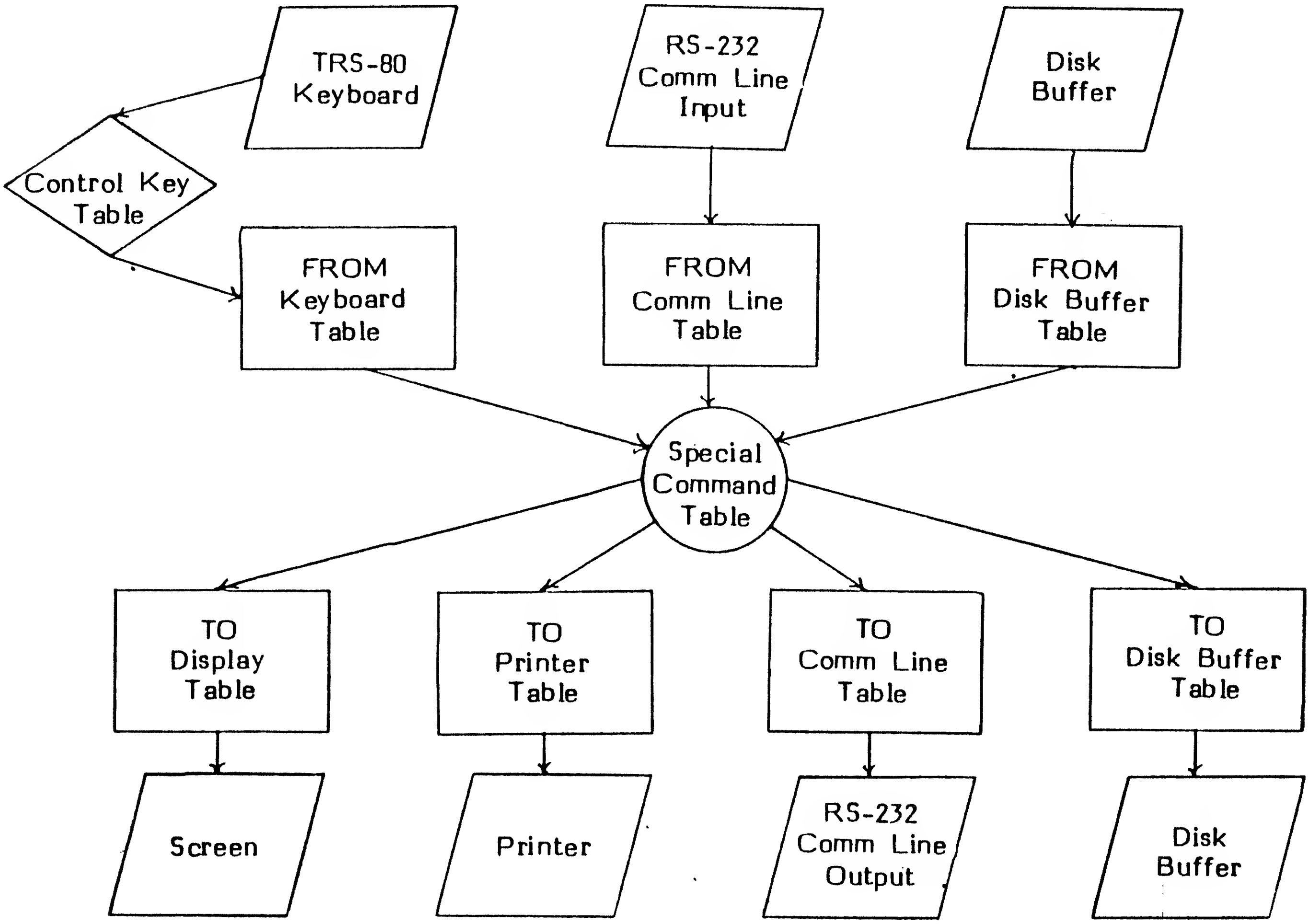
After you have changed a byte, you will see the new value in Hex in the table if you are on the correct page. You may now change more bytes, or simply press <BREAK> to return to command mode.

Examples of the use of OMNITERM's Tables

Since OMNITERM's special keyboard driver is only active when in OMNITERM's normal mode, you cannot use it to embed control characters, etc. into the auto-signon string (or for that matter into any string defined outside of OMNITERM's normal mode). Also, the semicolon character itself may not be placed into the auto-signon string, since it is used to symbolize the carriage return. The solution here is an example of the creative use of OMNITERM's tables. Since the auto-signon string is put through the FROM Disk Buffer table before being sent out, you could put some printable characters such as *, ?, >, digits, etc. that are not used in the rest of the auto-signon string in place of the desired unprintable characters, and then translate these to the desired characters in the FROM Disk Buffer table.

This is similar to the method used to allow OMNITERM to wait for a prompt made up of control characters. Since the control characters cannot be typed into the prompt string, other characters are used, and the control characters are translated to the characters actually typed in the FROM Comm Line table. This is another good example of clever use of the OMNITERM tables to get around a seemingly unsolvable problem.

Diagram of OMNITERM's Tables



U CHANGE UART SETTINGS

The UART is the device in the interface that does most of the work involved with making a series of pulses from a data byte when transmitting data and making data bytes from series of received pulses. Your Radio Shack RS-232C interface manual describes this device in detail and tells the meaning of Baud Rate, Parity, number of Data Bits (same as Word length) and number of Stop bits. Note that most timesharing systems use 300 baud, 7 data bits, even parity and 1 stop bit. If you are having trouble communicating at 300 baud, this is one of the first things you should check. Almost always you must use these settings at 300 baud.

OMNITERM allows you to fully reprogram the UART from the keyboard. If you have a Model I OMNITERM will by default set your UART to whatever values you have set the sense switches on the board, as described in Radio Shack's manual. If you have a Model III OMNITERM will use 300 baud, 7 data bits, even parity and 1 stop bit as its default settings, since the Model III has no sense switches. To change these settings with OMNITERM, press the U key from command mode. The bottom right of the screen will clear, and across from the message showing your current baud rate, you will see:

```
Baud Rate =
```

If you simply press <ENTER>, the baud rate will not change and you will go on to the next item. Or, you can type in any baud rate that the UART will accept and the UART will use this when you finish with the U command. The possible baud rates are 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, or 19200. If you type a number that is not one of these, no change will be made. After you type the number, press <ENTER> to go on to the next item, Data Bits.

OMNITERM will then show just below the previous line, across from the Data Bits display of the current number of data bits per word:

```
Data Bits =
```

Here you can type in the new number of data bits, either 5, 6, 7, or 8. If you do not type in any number, or if you type any other number than these, no change will be made. Press <ENTER> to go on.

Now OMNITERM will show on the next line:

```
Stop Bits =
```

You can now type in the new number of stop bits to be sent after each word. This may be either 1 or 2. If you type nothing, or anything but 1 or 2, no change will again be made. Press <ENTER> to go on to Parity.

The parity bit is an extra bit which, when used, makes the total number of bits that are 1 in each data word either an even or an odd number, even for even parity, or odd for odd parity. The purpose of this is error checking, since if a bit changes due to an error, the count will be different by one and the parity will be wrong. You will notice the Parity Error count in the usual command mode lisplay. This counts the number of parity errors as they occur.

Now across from the current Parity status display, OMNITERM shows:

```
Parity (E,O,N) =
```

Type in E, O, or N to change the parity the UART sends and expects to receive. E stands for Even, O for Odd and N for None. Press <ENTER> when you are done. The usual command mode display will return, with your new UART settings included.

A SEND CONTROL-A & QUIT

Since the TRS-80 interprets the <BREAK> key as a value of 1, the same as a control-A and this value of 1 is usually (as a default) used to generate a true Break, some easy way of sending the control-A is needed, i.e. some way to do it without generating a true Break. This is the function of the A command. Just press it and the control-A will be sent and you will then leave command mode and go back to normal mode.

There are other ways to do essentially the same thing, such as disabling the true Break function in the special command table, but this way is simpler.

@ SEND "AT" SYMBOL & QUIT

In normal mode, when you press the @ key, it is to go into command mode. To send an @ character out, you must use the @ key from command mode. This means you must press the @ key THREE times to send it once. As soon as you press it from command mode, it will be sent and you will return to normal mode.

B SCROLL BACK DISPLAY

The scroll back function is one of OMNITERM's most useful and unique functions. OMNITERM automatically stores in memory the last 2048 bytes it has sent to the screen. You may look back at it to see information that has scrolled off the top of the screen. This can be very useful, usually for checking back at directions or numbers that went by when you weren't looking or forgot to pay attention. Press the B key from command mode and from that point it works just like the E EXAMINE DISK I/O BUFFER system command. The screen will clear and you can then use the space bar to see the text, the <ENTER> key to re-start from the beginning of the text, and <BREAK> to leave.

Z ZERO REAL TIME CLOCK

If you wish to use the TRSDOS real time clock as a timer, so you know how long you were on a computer system where you pay by the minute or must pay for a long distance phone call, you need a way of setting the clock to zero when you start. Just press the Z key from command mode and the real time clock will be set to zero. Don't forget that you must always say "CLOCK (ON)" to DOS before you run OMNITERM so the clock will display on the screen.

F FILL BUFFER FROM DISK

In order to send files out from your TRS-80, you must first bring them into your disk I/O (Input/Output) buffer. This is usually done with the FILL BUFFER FROM DISK command. Press the F key from command mode and the bottom of the screen will be replaced with:

```
Enter load filespec ===>
```

Type in the name of the file you wish to transfer. It should be a standard TRSDOS style filespec, with extentions, passwords and drive numbers if you want them. Unlike the LOAD OMNITERM SETTINGS command, OMNITERM will assume no extention at all if you do not supply one. When you are done, press <ENTER> and OMNITERM will try to load the file. If a disk error occurs, the DOS message will print out and OMNITERM will let you read it while waiting for you to press any key. When you press a key, the usual command mode screen will return and you can try again.

A successful load will clear out whatever was in the buffer before and replace it with the file. You are now ready to transmit the file using the OUTPUT FROM BUFFER command, discussed earlier.

S SAVE BUFFER TO DISK

Once you have received some text and placed it into your buffer, you will want to save it in a disk file. This is done with the SAVE BUFFER TO DISK command. Press the S key from command mode and the bottom of the screen will show:

```
Enter your save filespec ===>
```

You now type in the name you want to save the text under, in standard TRSDOS form. OMNITERM will not supply any default extention. If a disk error occurs while saving the file, such as a full disk or other problem, OMNITERM will try to close the file, so that any text that WAS written will at least be retrievable. You will probably not get all of it after an error, but you may at least get some. OMNITERM will then print the DOS error message and wait for you to press a key before returning to command mode. In no case will the S function alter the contents of the disk I/O buffer, so if you have a problem saving it to disk, you can try again.

Uppercase Keyboard

OMNITERM by default changes all uppercase to lowercase and vice versa on the Model I. This way you must press <SHIFT> to get uppercase, as on a normal typewriter-style keyboard. This is fine for most applications, but occasionally you may want to get uppercase by default and press <SHIFT> for lowercase, as in Model I BASIC.

The Model III and some Model I operating systems allow you to do this by pressing the <SHIFT> and 0 keys together and thereby toggle back and forth between the two modes. This is the simplest way to solve the problem.

If your DOS or computer does not do this, you can do it by altering your FROM Keyboard translation table so that the Uppercase letters A-Z are no longer changed to lowercase and the lowercase letters a-z are no longer changed to Upper. Thus, when you want the special keyboard, just use OMNITERM with this translation table. A sample of such a table is included on your OMNITERM disk, as the file UPPER/OMT.

Special Command Functions

OMNITERM has a library of built-in special command functions that are used throughout the Special Command table, as described earlier. Many of these are assigned default usages and you may not need to ever change them. Others can only be used if you put them into the table where you want them.

Many of these functions work only on bytes that are from a particular source. This is possible since OMNITERM keeps separate track of the last character received from anywhere, LSTCHR, the last local character (disk or keyboard) LSTLOC, last remote character (comm line) LSTREM and last keyboard character LSTKEY.

You will notice that commands 6 through 16 only work if they are received over the comm line and if they are preceded by an ESCAPE. These are known as Escape sequences and are functions that are only valid after an ESCAPE has been sent. They are used for special screen control functions and by default are the VIDEOTEX standard, as used with CompuServe's MicroNet. Thus if you connect to the CompuServe Information Service with OMNITERM and tell CIS that you are a VIDEOTEX terminal, you can accept all control codes properly and act just as if you were a VIDEOTEX unit. In addition, these codes in OMNITERM's default are somewhat industry-standard.

Special Command Function Summary Table

Cmd #	Command Name	Decimal Default	Function
1	Break	1	Sends true Break to comm line
2	Bell	7	Flashes graphic bell, "beeps"
3	LF Suppression	10	If ON, kills LF if LSTCHR=CR
4	CR/LF Grouping	13	Sends CR/LF pairs, echos LFs
5	Enter Command Mode	64,96	Hit twice, goto Command Mode
6	Wide Character Mode	109	32 Char/Line if LSTREM=ESCAPE
7	Narrow Character Mode	108	64 Char/Line if LSTREM=ESCAPE
8	Cursor Up	65	Cursor up 1 line if LSTREM=ESCAPE
9	Cursor Down	66	Cursor down 1 line if LSTREM=ESCAPE
10	Cursor Left	68	Left 1 space if LSTREM=ESCAPE
11	Cursor Right	67	Right 1 space if LSTREM=ESCAPE
12	Home Cursor	72	Cursor to top left if LSTREM=ESCAPE
13	Clear to EOL	75	Clear to end of line if LSTREM=ESCAPE
14	Clear to EOP	74	Clr to end of page if LSTREM=ESCAPE
15	Clear Screen	106	Clear screen if LSTREM=ESCAPE
16	X/Y Cursor Position	89	Direct cursor move if LSTREM=ESCAPE
17	XOFF (Transmit OFF)	19	Pause buffer output
18	XON (Transmit ON)	17	Resume buffer output
19	Init/Open Buffer	18	Start input to buffer
20	Close Input Buffer	20	Stop input to buffer
21	Ignore but Store	27	Ignore, but use as Last Char
22	Send Auto Signon	5	Start sending auto signon msg
23	Ignore without Store	0	Ignore, do not save
24	Beep without Flash	NONE	Send tone to cassette only
25	Wide Char w/o ESCAPE	NONE	Same as #6, w/o ESCAPE
26	Narrow Char w/o ESCAPE	NONE	Same as #7, w/o ESCAPE
27	Home Cursor w/o ESCAPE	NONE	Same as #12, w/o ESCAPE
28	Clear Screen w/o ESCAPE	12	Clear Screen on Form Feed
29	X/Y Cur Posn w/o ESC	NONE	Same as #16 w/o ESCAPE
30	Horizontal Tab	9	Move to next tab stop
31	CLS From Keyboard	250	Clear Screen on key

Special Command Function Descriptions

1 - Break

The Break function sends what is known as a true Break over the communications line. This is not an ASCII character and has no numeric value to it, but is simply an extended zero signal sent over the interface. Many computer systems use this to interrupt them or get their attention. This function will only work when it is called from a Keyboard key. By default this is assigned to your <BREAK> key.

2 - Bell

When the Bell function is activated, a large graphic bell will briefly flash on the screen and at the same time a "beep" sound will be sent through the cassette port. This by default works when a control-G character is received. This is the ASCII code for BELL. Unless you are in half duplex mode, the character must be received over the comm line for this to work.

3 - LF Suppression

This function, by default set to Line Feed, ASCII 10, can be set ON or OFF from command mode. If OFF, it does nothing. If ON, it will suppress the character it is called from (usually Line Feed) if the previous character processed by OMNITERM (LSTCHR) was a carriage return. If the LSTCHR was anything else, this function will do nothing.

4 - CR/LF Grouping

This function, by default set to Carriage Return, ASCII 13, can be set ON or OFF from command mode. If OFF, it does nothing. If ON, every time OMNITERM gets a CR from any source, it will check where it is from. If it is local, OMNITERM will send a CR over the comm line as the first half of a CR/LF pair, then translate the original GR into a LF and process that normally. If the CR was remote, OMNITERM will send a LF over the comm line to move up the remote terminal's screen and then process the CR normally.

This is used when your TRS-80 is used as the host machine and you must service the remote device by echoing its CRs with LFs and by sending CR/LF pairs instead of just CRs.

5 - Enter Command Mode

This function, by default set to the @ key and the <SHIFT>-@ key (ASCII 64 is @ and <SHIFT>-@ is Accent Grave, ASCII 96) is used to enter command mode from normal mode. When you press this key twice with no other keys intervening, you will enter command mode. It is set to <SHIFT>-@ because some DOS <SHIFT>-0 UPPER/lower case switches also change @ to <SHIFT>-@. If you wanted to use a different key to enter command mode, you could reassign this function to the ASCII code for another key. This function only works when called from a keyboard byte.

6 - Wide Character Mode

When this function is invoked, it will check to see if the last character received was an ESCAPE. If it was not, nothing will happen. If it was, OMNITERM will place the TRS-80 into its 32 character per line wide character mode. This is used primarily when OMNITERM is acting like a VIDEOTEX machine. The default value for this is ASCII 109, the small letter m.

7 - Narrow Character Mode

This function is used to return to the normal TRS-80 64 character per line size. It will act only if the last character received over the comm line was an ESCAPE. The default value is ASCII 108, the small letter l.

8 - Cursor Up

This is another function that requires the ESCAPE code to have been received. It moves the cursor up one line on the screen. The default value is ASCII 65, the letter A.

9 - Cursor Down

Moves the cursor down one line on the screen. Default value is ASCII 66, letter B. Requires ESCAPE to be received first.

10 - Cursor Left

Moves the cursor left one space. Default value is ASCII 68, the letter D. Requires ESCAPE first.

11 - Cursor Right

Moves the cursor right one space. Default value is ASCII 67, the letter C. Requires ESCAPE first.

12 - Home Cursor

This also requires ESCAPE to have been received and its default value is ASCII 72, the letter H. When it is used, the cursor will go to the Home position on the screen - the upper left corner. The contents of the screen will not change.

13 - Clear to EOL

Requires ESCAPE first and the default is ASCII 75, letter K. It clears the screen from the position of the cursor to the end of that same line, thus it Clears to End Of Line.

14 - Clear to EOP

Requires ESCAPE first, the default is ASCII 74, letter J. It clears the screen from the cursor's current position to the end of the screen, thus it Clears to End Of Page.

15 - Clear Screen

Requires ESCAPE first, has a default value of ASCII 106, the small j. It clears the screen and puts the cursor in its Home position in the upper left corner of the screen.

16 - X/Y Cursor Position

This function requires ESCAPE before it and has a default value of 89, an ASCII Y. It lets the cursor go directly to any spot on the screen with one command. After this command is invoked, the next two characters received over the comm line specify first the Y, or vertical and then the X, or horizontal position on the screen that the cursor will move to. The ASCII value of these characters, minus 32, are the Y and X coordinates for the cursor's new position. If either coordinate indicates a location that is not on the screen, the last row or column on the screen in that direction will be used instead. Note that the count of X and Y positions starts from 0,0 which is the upper left corner of the screen.

17 - XOFF (Transmit OFF)

This is the method of pausing OMNITERM's output from the buffer that was briefly mentioned before. This command can only be invoked from the comm line. When it is received, OMNITERM will stop outputting from its buffer at once. When the XON function is invoked, it will continue from where it left off.

This is a very common method for controlling file output speed that you will find to be compatible with many computers. Its default value is 19, an ASCII DC3, Device Control 3. This is the standard control code for this function and you will probably never have to change it. Note that many computer systems accept a Control-S code to pause their transmission to you. This is because the Control-S code is an ASCII DC3 and the remote system is responding just as OMNITERM would with with the same code.

18 - XON (Transmit ON)

This function is the companion to XOFF. After the XOFF command has been used, OMNITERM will wait for the XON command before resuming output. It will continue from where it left off when the XOFF command was received. This command is not meant to start output remotely, without any previous XOFF, but merely to resume output after the XOFF command. The default value for this function is 17, ASCII DC1, a Control-Q code. This is standard, just as XOFF is and will probably never need to be changed.

19 - Init/Open Buffer

This command has the same effect as when you enter command mode and press I, for INPUT TO BUFFER. It clears the buffer and everything received thereafter goes into it. If after receiving this command you go to command mode, you will see that INPUT TO BUFFER is ON. This is used so that the remote computer system can open your input buffer when it wants to send you a file. Just as with command mode, if you are already outputting data when this command is received, it will be ignored. When this command is received and acted upon, you will see on your normal mode screen:

```
*** INPUT BEGUN
```

This is to inform you that your buffer has been opened. If you want the file being transmitted, it is not a good idea to type anything until it is done, or you may put some stray characters into your buffer. The default value for this function is 18, ASCII DC2. This is a fairly standard use of this code and many systems support it.

20 - Close Input Buffer

This command is usually used as a companion to Init/Open Buffer (special command number 19), but it need not be. It simply closes the input buffer if it is already open, so that no new characters will go into it. You will see on your normal mode screen:

```
*** INPUT COMPLETED
```

This means the command has been received and done. This function is used by remote systems when they are finished sending a file. If they did not use it, you might get some stray data at the end of your file (such as the remote system's prompt for your next command) that you would have to edit out later. The default for this function is 20, an ASCII DC4 and is somewhat standard. The function, like all the special command functions assigned by default to Device Control codes, will work only on bytes received over the comm line.

21 - Ignore but Store

This function allows OMNITERM to ignore a character in that it will not send it to the screen, printer, buffer, etc, but will still store it as the most recently processed byte in LSTCHR, LSTREM, LSTLOC and LSTKEY, as appropriate. This is assigned by default to 27, the ASCII code for ESCAPE. This is used when a byte primarily indicates the use of the following byte, as with ESCAPE, which must precede some functions for them to work.

22 - Send Auto Signon

This function causes the Auto Signon message to be sent out. By default, this function occurs on the value for Control-0, ENQ, 5. This can be triggered from the keyboard with Control-0 in the normal way, or can be triggered by the remote system when it sends an ENQ, or Who-Are-You character.

23 - Ignore without Store

When this function is assigned to a byte, that byte is ignored completely by OMNITERM. Whenever it comes in from a device, OMNITERM forgets completely about it and looks for the next byte. It by default assigned to 0, Null, so that you can translate any byte you want to ignore to Null.

24 - Beep without Flash

This is for those who feel that the flashing picture of a bell is distracting, while the "beep" sound through the cassette port (special command number 2 - Bell) is still useful. These people may substitute this function for #2, as it only produces the "beep", without the flashing bell. This command is not assigned by default to any byte.

25 - Wide Character Mode without ESCAPE

This functions identically to special command number 6, Wide Character Mode, except that it does NOT require ESCAPE to be received before its use. It is not assigned by default to any byte.

26 - Narrow Character Mode without ESCAPE

Identical to special command number 7, Narrow Character Mode, except that it does not require ESCAPE. Not assigned a default.

27 - Home Cursor without ESCAPE

Identical to special command number 12, Home Cursor, except that it does not require ESCAPE. Not assigned a default.

28 - Clear Screen without ESCAPE

Like special command number 15, this clears the screen, but it does not require ESCAPE. By default, this is assigned to ASCII 12, Form Feed. Some computer systems expect your terminal to clear the screen upon receipt of a Form Feed character.

29 - X/Y Cursor Position without ESCAPE

Identical to special command number 16, X/Y Cursor Position, except that it does not require ESCAPE. Not assigned a default.

30 - Horizontal Tab

When this function is invoked, the cursor will move forward to the next tab position on the screen and stop there. Tab positions are every 8 characters on the screen. That is screen positions 0, 8, 16, 24, 32 and so on. By default this is assigned to ASCII 9, Horizontal Tab. This code is normally transmitted by the right-pointing arrow key. Unless you are in half duplex mode, the character must be received over the comm line for this to work.

31 - Clear Screen from Keyboard

This is for clearing the screen directly from the keyboard, unlike the other clear screen special commands that are meant to be used when the remote system calls them. It by default works when control-: is pressed, because this special command defaults to 250 decimal, and control-: by default generates the 250 in the control key table.

With the cursor control functions that act without the need for ESCAPE, all cursor commands can be assigned to a byte and work without ESCAPE. The cursor movement commands described in Radio Shack's manuals can be used as well. For example, there is ASCII 30 for Clear to End of Line, 31 for Clear to End of Page, etc.

OMNITERM Utilities

Included on your OMNITERM disk are five programs which may be of use to you when working with OMNITERM. They are:

1) BINHEX/CMD A program to convert binary files to ASCII Hex files, so that they may be transmitted in a standard format.

2) HEXBIN/CMD A program to re-convert the ASCII Hex data created by BINHEX/CMD back to binary.

3) BINERR/CMD Converts any file to a special error-detecting, bit-packed, checksum format. More efficient than BINHEX.

4) ERRBIN/CMD A program to re-convert files made by BINERR which will detect any errors.

5) TEXTED/BAS A line-oriented text editor that can be used to create text to be transmitted by OMNITERM, or to modify received data.

BINHEX/CMD

OMNITERM is primarily designed to transfer text files to remote computers and to receive text files. Often, you may want to send object code or other binary files (such as compressed BASIC programs) to other TRS-80 computers. This can be done by setting OMNITERM so that it will not change any characters during transmission or reception. However, this approach will only work if the other TRS-80 is also using OMNITERM and if the RS-232 interface is using 8 bits of data. Also, if you want to leave the file on a timesharing computer system such as MicroNet or the Source before it is received, these systems will not allow you to transfer binary files through them.

BINHEX/CMD allows you to convert the binary file to a text file of ASCII Hex characters so that you can send the file with much more ease. When you run BINHEX, it will ask you for the source and destination files you wish to use. The source file is the binary file you wish to convert and the destination file will contain the resulting ASCII Hex code.

BINHEX will create the destination file by converting each byte of source code into a two-byte ASCII Hex value and will place no spaces between Hex values in the destination file. At the end of each 60 bytes of destination file (made from 30 bytes of source) and at the end of the file, a carriage return character is inserted. Note that this is the same format used by Lance Micklus' ST-80 terminal program and that Hex files created by BINHEX will be identical with those created by ST-80.

HEXBIN/CMD

This program reconverts the Hex files created by BINHEX back into binary files. When HEXBIN is run, it will ask for source and destination files. The source file should be a Hex file made by BINHEX or another program using the same format and the destination file will be the binary file you wish to recreate.

BINERR/CMD & ERRBIN/CMD

Many times it will be desireable to transfer files with some way to detect if any errors are present in the received file. HEXBIN and BINHEX do not supply this feature since they simply translate each byte of the source file into its hex equivalant, with no provision for error checking. This format is also very wasteful of disk and memory space since a hex file must take up exactly twice as much room as the original file. For these reasons, the simple hex format is not a very satisfactory solution to the problem. BINHEX and HEXBIN are on the OMNITERM disk only for compatiblity with other programs which already use this format.

Much like BINHEX, BINERR translates any file into its own special format. BINERR uses an entirely different format however. It is an error-detecting bit-packed format with checksums at the end of each line and a sum of all checksums at the end of the file. BINERR/CMD is used to create such a file from any source file, either binary or text and ERRBIN/CMD will convert the error-format file back to the original version.

The format created by BINERR packs six bits into each error-formatted byte, as opposed to four for BINHEX. This means that BINERR can store 50% more data in the same space. When ERRBIN is run, it will detect any errors found in the file and print an appropriate message. If this happens, you should re-transmit the file until no errors are found.

The exact format that BINERR and ERRBIN use is described in the appendix.

BINERR and ERRBIN should be used whenever a large file must be transfered over noisy communications lines, or when a binary file is to be moved. You will find it faster and better than BINHEX and HEXBIN and you should use it whenever possible.

TEXTED/BAS

There are many different kinds of data that you may wish to transfer with OMNITERM. You may wish to send BASIC programs, data files, or you may want to pre-compose a message for an electronic mail or bulletin board system. With TEXTED, you can create and modify files before sending them and you can edit files that have been received to remove extra information, such as mistyped commands or system prompts.

TEXTED is a BASIC program and it stores the text in memory, so the size of a file is limited by the amount of memory in your computer. It is a line-oriented text editor, which means it handles the text one line at a time and that you must refer to text by line number. The program is mostly self-explanitory and you should have little problem with it. When you RUN it, you will see a list of the commands and what they do. Just press one of the letters corresponding to what you want to do and the program will either do it, or ask you for more information. The functions available are:

Key	Function
?	Show list of commands
S	Save file to disk
L	Load file from disk
R	Retype line(s)
D	Delete line(s)
I	Insert line(s)
T	Type line(s) out to screen
P	Print line(s) out to printer
Q	Quit program and go to DOS
E	Edit within a line

Note that you do not have to press <ENTER> after one of these keys and that the line numbers start with 0, not 1. The total number of lines in the file is always shown when TEXTED is ready to accept a command (one of the listed keys). Thus the lines in the file go from 0 to the number listed. If, for any command, you specify lines that do not exist, TEXTED will ignore those and use only those that are in the file.

? Listing commands

If you press the question mark, the list of commands will be shown on the screen. So, if you don't know what to do, just press ?.

S Save file to disk

When you are done editing the file and have it just the way you want it, press S and the file will be saved on disk. You will be prompted to enter the filename first.

L Load file from disk

To edit a file that already exists, such as one you have received with OMNITERM, press L to load in the file. You will be asked the file name. After you type it the file will load in.

R Retype line(s)

To replace one or more lines in succession, press R. You will be asked to enter the first and last line numbers you want to retype and then the line numbers of each will print on the screen. Retype each one until TEXTED asks for a new command.

D Delete line(s)

To remove one or more lines from the file, use D. You will have to enter the first and last line numbers that you want to delete. If you only want to remove one line, enter its number as both the first and last line. If you try to delete more than 6 lines, you will be asked for confirmation before it is done. This is to ensure you do not delete a large portion of the file by accident.

After the lines are removed, the line numbers of all those lines following will be moved up into the gap left by the deleted lines. As a result of this, you will never have gaps of line numbers between lines.

I Insert line(s)

To enter in new lines, press I. You will be asked which line number you want the new lines to come after. Enter this. As you type each new line, the lines below will be moved down to make room for the new lines. When you are done, enter the word "END" as your line.

T Type line(s) out to screen

To display lines on the screen, press T. You will be asked for the first and last lines you wish to view. Remember that lines start with 0.

P Print line(s) out to printer

This works the same as T, except it sends the text to the printer.

Q Quit program

After you are done editing and have saved the text to disk, press Q to quit TEXTED. You will be asked if you are sure. Say YES if you are and you will return to "DOS READY" level and the text will be gone from memory. Be careful not to press this by mistake! If you say anything other than YES, you will return to the menu.

E Edit within a line

If there is an error within a line, you can change it, without retyping the entire line, by pressing E. You will have to enter the line number you want to edit. You will be asked to enter the OLDSTRING, or old phrase as it was wrong. You will then enter the NEWSTRING, or what you want the old phrase to be replaced with. For instance, in the line:

```
I think commputers are great because they are fast.
```

To change "commputers" to "computers", the OLDSTRING would be "commputers", or "mm" and NEWSTRING would be "computers", or "m". If there is more than one occurence of OLDSTRING in the line, only the first one will be affected. After the first is changed, you can then change the next one and so on.

Supplied Setting Files

There are seven /OMT OMNITERM setting file tables on the OMNITERM disk. These are for your own use and can be used as examples of possible OMNITERM setting tables. You will probably want to modify them for your own particular use.

UPPER/OMT

This is identical to the default OMNITERM settings except that upper and lowercase keyboard characters are not swapped, as they are in the Model I defaults. Model III owners will not want to use this file since it makes no changes to the Model III defaults.

SOURCE/OMT

This file is meant for using the TRS-80 Model I with the Source, a popular information-service type timesharing computer system. Three changes were made for the Source. First, the <BREAK> key now sends Control-P rather than a true break. This was done by changing 1 in the Special Command Table to 0 to turn off the true Break function and changing 1 in the FROM Keyboard table to 16, the decimal value of Control-P.

Second, the underscore character is translated to a semicolon. The UPI news service on the Source often sends underscores instead of semicolons. This was done by changing 95 decimal, the value of underscore, in the FROM Comm Line table, to 59 decimal, the value of semicolon.

Lastly, UPI news service also at times sends a 26 decimal which causes OMNITERM to home the cursor but not to clear the screen. This is changed to a null by changing 26 in the TO Display table to 00, for Null.

There is also a sample Auto-Signon message for use with Tymnet and the Source. You will want to change the sample password and user number to your own.

SOURCE3/OMT

This is identical to SOURCE/OMT, except that its changes are made from the TRS-80 Model III default table contents. Model III owners will want to use this instead of SOURCE/OMT.

MNET/OMT

This is for use with Compuserve Information Service, or MicroNet. (MNET for short.) Changes are to the R SCREEN REFORMATTING, which is turned OFF and to the <BREAK> key, which now sends a Control-C. Also included is a sample Auto-Signon message for use with MicroNet. You will want to change this to your own user number and password. This table is for use with TRS-80 Model I.

MNET3/OMT

This is the same as MNET/OMT, except that it is for use with the TRS-80 Model III, just as SOURCE3/OMT is.

DJNS/OMT and DJNS3/OMT

These are identical OMNTIERM setting files except that DJNS is for the Model I TRS-80 and DJNS3 for the Model III (or for Model I users who want an all-caps keyboard).

These setting files are meant for use with the Dow Jones News Retrieval Service. Six changes have been made from the standard OMNITERM defaults.

One: A sample auto-signon string for the service when used with Tymnet is included. You will want to change the password to your own.

Two: In the TO DISPLAY table, the hex value 1C has been changed to the value of 0D. Each time Dow Jones gives a new quote, it sends a 1C hex character, which normally makes OMNITERM home the cursor. This has been changed to a simple carriage return, 0D hex, to make the screen look neater and eaiser to read.

Three: In the FROM COMM LINE table, the value 1E hex has been changed to 3F hex. Dow Jones sends a 1E hex each time it is done with a quote and is ready to accept a new stock. This change makes the 1E appear as a question mark, or 3F hex. With this change you may build a file of stocks using TEXTED, and then send them all to Dow Jones at once using OMNITERM's prompted output mode. Just specify the question mark as the prompt, and each stock name will be sent when Dow Jones is ready for it. This can save you money since Dow Jones charges by the minute.

Four: In the FROM COMM LINE table, the value 11 hex has been changed to 0D, or carriage return. This is sent occasionally by Dow Jones and will make OMNITERM start transmitting a file since hex 11 is DC1, or XON. With this change, it simply appears as an extra carriage return.

Five: In the FROM COMM LINE table, the value 13 hex has been changed to 0D, or carriage return. This is sent occasionally by Dow Jones and will make OMNITERM stop transmitting a file that is being sent, since hex 13 is DC3, or XOFF. With this change, it simply appears as an extra carriage return.

Six: Screen Reformatting has been turned OFF. With it turned ON, some column displays from Dow Jones looked messy.

Conclusion

OMNITERM is the software you can use to communicate with almost any equipment your hardware interface will connect to. By accounting for control character incompatibility with translation and special command tables, it allows the remote system to continue using its own standard software, with no customization required. The TRS-80 user can perform all the needed changes within OMNITERM.

You do not have to understand and use all the features in OMNITERM in order to get useful work done with it, but the more you can feel comfortable with, the more flexibility you will have in your communications. If you understand all of OMNITERM's abilities, almost any communications problem can be solved through clever use of OMNITERM's capabilities.

If you can think of some new features you would like incorporated into OMNITERM, or have suggestions for improvements to OMNITERM, please write to Lindbergh Systems. Also, if you note any errors, please contact us.

All registered OMNITERM owners will be notified of changes and improvments in OMNITERM. Our current policy allows registered owners to upgrade their programs for a fixed fee of $15, unless the retail price of OMNITERM rises, in which case the fee will be the change in price, plus $15.

NOTE: The first registered OMNITERM owner to report an error we don't know about will receive the next available upgrade of OMNITERM absolutely FREE. This is to encourage the reporting of errors to us. If you don't tell us about the bugs, we can't fix them. Even if you report an error we already know about, you will receive our undying gratitude (also free).

Finally, we would like to thank the many people who encouraged and aided the production of OMNITERM and this manual, both knowingly and unknowingly. In particular, we would like to thank Robert Alexander, for his help with this manual and Lance Micklus, for unknowingly inspiring us to better things. But if you find anything you don't like, blame us, not them.

Appendix A - Translation Table Default Settings

Unless otherwise noted, all bytes not mentioned are translated to themselves. Only those translated to something else are described here.

TO Display

Input Byte	Output Byte
Dec = 91 *** MODEL I ONLY ***	Dec = 60
Hex = 5B	Hex = 3C
ASCII = Open Square Bracket	ASCII = Less Than Symbol
Dec = 93 *** MODEL I ONLY ***	Dec = 62
Hex = 5D	Hex = 3E
ASCII = Close Square Bracket	ASCII = Greater Than Symbol

The TRS-80 Model I character generator cannot display the square bracket characters, so OMNITERM will display them as corner brackets made from greater and less signs.

TO Comm Line, TO Disk Buffer, TO Printer

No default translations at all.

FROM Keyboard

Input Byte	Output Byte
Dec = 27	Dec = 94
Hex = 1B	Hex = 5E
ASCII = ESCAPE	ASCII = Up-Carat
Keyboard = Shift-UP ARROW	

To send an ASCII Up-Carat, press Shift-UP ARROW. This will generate an ESCAPE, which will be translated.

Input Byte	Output Byte
Dec = 91	Dec = 27
Hex = 5B	Hex = 1B
ASCII = Open Square Bracket	ASCII = ESCAPE
Keyboard = UP-ARROW	

To send an ESCAPE, press UP-ARROW. This will generate an open square bracket code (in BASIC printed as UP-ARROW and used for exponentiation), which is translated to an ESCAPE.

On the Model I TRS-80 only, all uppercase ASCII letters A-Z are translated to lowercase a-z, and all lowercase letters a-z are translated to uppercase A-Z by OMNITERM. This is not true when OMNITERM is run on the Model III computer.

Control Key Table

Input Byte	Output Byte

Dec = 48
Hex = 30
Keyboard = Control-0
	Dec = 5
	Hex = 5
	ASCII = ENQ

Dec = 49
Hex = 31
Keyboard = Control-1
	Dec = 124
	Hex = 7C
	ASCII = | (Broken Bar)

Dec = 50
Hex = 32
Keyboard = Control-2
	Dec = 95
	Hex = 5F
	ASCII = _ (Underscore)

Dec = 51
Hex = 33
Keyboard = Control-3
	Dec = 123
	Hex = 7B
	ASCII = { (Open Brace)

Dec = 52
Hex = 34
Keyboard = Control-4
	Dec = 125
	Hex = 7D
	ASCII = } (Close Brace)

Dec = 53
Hex = 35
Keyboard = Control-5
	Dec = 92
	Hex = 5C
	ASCII = \ (Backslash)

Dec = 54
Hex = 36
Keyboard = Control-6
	Dec = 126
	Hex = 7E
	ASCII = ~ (Tilde)

Dec = 55
Hex = 37
Keyboard = Control-7
	Dec = 127
	Hex = 7F
	ASCII = DELETE

Dec = 56
Hex = 38
Keyboard = Control-8
	Dec = 91
	Hex = 5B
	ASCII = [(Open Bracket)

Dec = 57
Hex = 39
Keyboard = Control-9
	Dec = 93
	Hex = 5D
	ASCII =] (Close Bracket)

Dec = 58
Hex = 3A
Keyboard = Control-:
	Dec = 250
	Hex = FA
	ASCII = Trigger Keyboard CLS

The digits 0-9 are for the special characters that are not on the standard TRS-80 keyboard. Note that Control-8/Control-9 which are translated to open and close square brackets, are on the open and close parentheses keys. Also note that Control-0 becomes an ENQ to trigger the auto-signon function. And Control-semicolon (;) becomes 250 decimal to trigger the Clear Screen from Keyboard function.

In addition to the above, all uppercase and lowercase ASCII characters A-Z and a-z are translated to Control A-Z.

FROM Disk Buffer, FROM Comm Line

No default translations at all.

Appendix B - Special Command Table Default Settings

All bytes in the Special Command table not described here are set by default to zero and no function will occur when they are processed by OMNITERM.

Processed Byte	Cmd Number	Name/ASCII value
Dec = 0	Dec = 23	Ignore without Store
Hex = 00	Hex = 17	ASCII = NULL
Dec = 1	Dec = 1	Break
Hex = 01	Hex = 01	ASCII = None
Dec = 5	Dec = 22	Send Auto-Signon
Hex = 05	Hex = 16	ASCII = ENQ
Dec = 7	Dec = 2	Bell
Hex = 07	Hex = 02	ASCII = BELL
Dec = 9	Dec = 30	Horizontal Tab
Hex = 09	Hex = 1E	ASCII = Horiz. Tab
Dec = 10	Dec = 3	LF Suppression
Hex = 0A	Hex = 03	ASCII = Line Feed
Dec = 12	Dec = 28	CLS without ESCAPE
Hex = 0C	Hex = 1C	ASCII = Form Feed
Dec = 13	Dec = 4	CR/LF Grouping
Hex = 0D	Hex = 04	ASCII = Carriage Rtrn
Dec = 17	Dec = 18	XON (Transmit ON)
Hex = 11	Hex = 12	ASCII = DC1
Dec = 18	Dec = 19	Init/Open Buffer
Hex = 12	Hex = 13	ASCII = DC2
Dec = 19	Dec = 17	XOFF (Transmit OFF)
Hex = 13	Hex = 11	ASCII = DC3
Dec = 20	Dec = 20	Close Input Buffer
Hex = 14	Hex = 14	ASCII = DC4
Dec = 27	Dec = 21	Ignore but Store
Hex = 1B	Hex = 15	ASCII = ESCAPE
Dec = 64	Dec = 5	Enter Command Mode
Hex = 40	Hex = 05	ASCII = @
Dec = 65	Dec = 8	Cursor Up
Hex = 41	Hex = 08	ASCII = A

Processed Byte	Cmd Number	Name/ASCII value
Dec = 66	Dec = 9	Cursor Down
Hex = 42	Hex = 09	ASCII = B
Dec = 67	Dec = 11	Cursor Right
Hex = 43	Hex = 0B	ASCII = C
Dec = 68	Dec = 10	Cursor Left
Hex = 44	Hex = 0A	ASCII = D
Dec = 72	Dec = 12	Home Cursor
Hex = 48	Hex = 0C	ASCII = H
Dec = 74	Dec = 14	Clear to EOP
Hex = 4A	Hex = 0E	ASCII = J
Dec = 75	Dec = 13	Clear to EOL
Hex = 4B	Hex = 0D	ASCII = K
Dec = 89	Dec = 16	X/Y Cursor Position
Hex = 59	Hex = 10	ASCII = Y
Dec = 96	Dec = 5	Enter Command Mode
Hex = 60	Hex = 05	ASCII = ` (Accent)
Dec = 106	Dec = 15	Clear Screen
Hex = 6A	Hex = 0F	ASCII = j
Dec = 108	Dec = 7	Narrow Char Mode
Hex = 6C	Hex = 07	ASCII = l
Dec = 109	Dec = 6	Wide Character Mode
Hex = 6D	Hex = 06	ASCII = m
Dec = 250	Dec = 31	CLS from Keyboard
Hex = FA	Hex = 1F	Keyboard = Control-:

Appendix C - The ASCII Character Code

This is the American Standard Code for Information Interchange. It is not the exact same code as used by the TRS-80, since most computer manufacturers, Tandy included, change a few of the less often used characters to their own codes. On the TRS-80, some of the special characters will show differently. You will have to experiment to find them out. Try running this program in TRS-80 Level II BASIC:

```
10 FOR A=0 TO 255 : PRINT A,CHR$(A) : NEXT A
```

This will print a list of the decimal values and their displayed characters on your TRS-80. For more information on the ASCII code, refer to Kilobaud Microcomputing magazine, November 1980, page 129, "All about ASCII".

Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII
0	00	NUL	32	20	SPACE	64	40	@	96	60	`
1	01	SOH	33	21	!	65	41	A	97	61	a
2	02	STX	34	22	"	66	42	B	98	62	b
3	03	ETX	35	23	#	67	43	C	99	63	c
4	04	EOT	36	24	$	68	44	D	100	64	d
5	05	ENQ	37	25	%	69	45	E	101	65	e
6	06	ACK	38	26	&	70	46	F	102	66	f
7	07	BEL	39	27	'	71	47	G	103	67	g
8	08	BS	40	28	(	72	48	H	104	68	h
9	09	HT	41	29	)	73	49	I	105	69	i
10	0A	LF	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	46	2E	.	78	4E	N	110	6E	n
15	0F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	DLE	48	30	0	80	50	P	112	70	p
17	11	DC1	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	DC3	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	NAK	53	35	5	85	55	U	117	75	u
22	16	SYN	54	36	6	86	56	V	118	76	v
23	17	ETB	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	EM	57	39	9	89	59	Y	121	79	y
26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	FS	60	3C	<	92	5C	\	124	7C	|
29	1D	GS	61	3D	=	93	5D	]	125	7D	}
30	1E	RS	62	3E	>	94	5E	^	126	7E	~
31	1F	US	63	3F	?	95	5F	_	127	7F	DEL

Appendix D - The EBCDIC Character Code

This code was defined by IBM. You will notice that many values have no character assigned to them. Also, beware that there are many gaps within the letters. You will need this information if you want to create a translation table to be used with the EBCDIC code. Since many of OMNITERM's default function values conflict with EBCDIC, you will have to move these functions to different values in the special command table if you want to work with EBCDIC. For more information on EBCDIC, refer to IBM System/360 Principles of Operation, Appendix F, page 150.3.

Dec	Hex	EBCDIC	Dec	Hex	EBCDIC	Dec	Hex	EBCDIC	Dec	Hex	EBCDIC
0	00	NUL	32	20	DS	64	40	SPACE	96	60	-
1	01	SOH	33	21	SOS	65	41		97	61	/
2	02	STX	34	22	FS	66	42		98	62	
3	03	ETX	35	23		67	43		99	63	
4	04	PF	36	24	BYP	68	44		100	64	
5	05	HT	37	25	LF	69	45		101	65	
6	06	LC	38	26	ETB	70	46		102	66	
7	07	DEL	39	27	ESC	71	47		103	67	
8	08		40	28		72	48		104	68	
9	09		41	29		73	49		105	69	
10	0A	SMM	42	2A	SM	74	4A	CENTS	106	6A	
11	0B	VT	43	2B	CU2	75	4B		107	6B	,
12	0C	FF	44	2C		76	4C	<	108	6C	%
13	0D	CR	45	2D	ENQ	77	4D	(	109	6D	_
14	0E	SO	46	2E	ACK	78	4E	+	110	6E	>
15	0F	SI	47	2F	BEL	79	4F	|	111	6F	?
16	10	DLE	48	30		80	50	&	112	70	
17	11	DC1	49	31		81	51		113	71	
18	12	DC2	50	32	SYN	82	52		114	72	
19	13	TM	51	33		83	53		115	73	
20	14	RES	52	34	PN	84	54		116	74	
21	15	NL	53	35	RS	85	55		117	75	
22	16	BS	54	36	UC	86	56		118	76	
23	17	IL	55	37	EOT	87	57		119	77	
24	18	CAN	56	38		88	58		120	78	
25	19	EM	57	39		89	59		121	79	
26	1A	CC	58	3A		90	5A	!	122	7A	:
27	1B	CU1	59	3B	CU3	91	5B	$	123	7B	#
28	1C	IFS	60	3C	DC4	92	5C	*	124	7C	@
29	1D	IGS	61	3D	NAK	93	5D	)	125	7D	'
30	1E	IRS	62	3E		94	5E	;	126	7E	=
31	1F	IUS	63	3F	SUB	95	5F	NOT	127	7F	"

Dec	Hex	EBCDIC	Dec	Hex	EBCDIC	Dec	Hex	EBCDIC	Dec	Hex	EBCDIC
128	80		160	A0		192	C0		224	E0	
129	81	a	161	A1		193	C1	A	225	E1	
130	82	b	162	A2	s	194	C2	B	226	E2	S
131	83	c	163	A3	t	195	C3	C	227	E3	T
132	84	d	164	A4	u	196	C4	D	228	E4	U
133	85	e	165	A5	v	197	C5	E	229	E5	V
134	86	f	166	A6	w	198	C6	F	230	E6	W
135	87	g	167	A7	x	199	C7	G	231	E7	X
136	88	h	168	A8	y	200	C8	H	232	E8	Y
137	89	i	169	A9	z	201	C9	I	233	E9	Z
138	8A		170	AA		202	CA		234	EA	
139	8B		171	AB		203	CB		235	EB	
140	8C		172	AC		204	CC		236	EC	
141	8D		173	AD		205	CD		237	ED	
142	8E		174	AE		206	CE		238	EE	
143	8F		175	AF		207	CF		239	EF	
144	90		176	B0		208	D0		240	F0	0
145	91	j	177	B1		209	D1	J	241	F1	1
146	92	k	178	B2		210	D2	K	242	F2	2
147	93	l	179	B3		211	D3	L	243	F3	3
148	94	m	180	B4		212	D4	M	244	F4	4
149	95	n	181	B5		213	D5	N	245	F5	5
150	96	o	182	B6		214	D6	O	246	F6	6
151	97	p	183	B7		215	D7	P	247	F7	7
152	98	q	184	B8		216	D8	Q	248	F8	8
153	99	r	185	B9		217	D9	R	249	F9	9
154	9A		186	BA		218	DA		250	FA	
155	9B		187	BB		219	DB		251	FB	
156	9C		188	BC		220	DC		252	FC	
157	9D		189	BD		221	DD		253	FD	
158	9E		190	BE		222	DE		254	FE	
159	9F		191	BF		223	DF		255	FF	

Appendix E - OMNITERM Message Meanings

These messages may show on your normal mode screen from time to time. This Appendix will explain what they mean.

*** ERROR --> I/O BUFFER FULL
*** INPUT TO BUFFER STOPPED

This will happen when you are either loading a disk file into your disk I/O buffer, or when you are using the INPUT TO BUFFER command mode function. The message means that the buffer is full and cannot hold any more data. You will notice that the command mode buffer indicator shows that all bytes in the buffer are used.

If you were loading a file, the file will be closed and your buffer will hold all the data that had been loaded into it, up to the time when the message was printed. You can now send it, or find a way to break up the file into smaller pieces and send them one at a time.

If you were using the INPUT TO BUFFER function, the function will be turned OFF and the information in the buffer will be preserved. You can save this information to disk and continue with more data.

*** ERROR --> PRINTER BUFFER FULL
*** PRINTER TURNED OFF

This message will show when the printer has fallen too far behind the comm line to keep up. OMNITERM can only buffer a total of 2048 bytes before its print buffer becomes full. If this happens, your printer may be turned off or unplugged and OMNITERM is trying to buffer data going to a shut off printer.

When this message shows, the PRINTER flag in command mode will show that the printer is OFF, meaning that no new data is going into the print buffer. Since the buffer still has 2048 unprinted bytes in it, your printer will continue to print these out until the buffer is empty. You can turn the printer back ON at any time, although if the buffer is still full or nearly full, you may soon get this message again.

*** OUTPUT COMPLETE

This is OMNITERM's normal message meaning that the OUTPUT FROM BUFFER function is completed and the entire buffer contents have been sent. After this message, you will see the flag for OUTPUT FROM BUFFER go to OFF.

*** INPUT BEGUN

This message will show when OMNITERM executes special command number 19, Init/Open Buffer. This command opens your disk I/O buffer for input and the message indicates to you that this process has started. If the buffer was opened by mistake, you may want to go to command mode and turn INPUT TO BUFFER to OFF.

** INPUT COMPLETE

This means that your disk I/O buffer has been closed because OMNITERM has received special command number 20, Close Input Buffer. In command mode, you will see that INPUT TO BUFFER is now OFF.

Large Picture of a Bell

When a large picture of a bell flashes on your screen, this means that special command number 2, Bell has been done. Normally this means that (by default) a control-G, ASCII BELL character has been received. This code causes the bell to ring on Teletypes, so OMNITERM flashes a picture of a bell and goes BEEP through the cassette port.

Parity, Framing, & Overrun Errors

Parity errors occur when the sum of bits in a byte is not what it is expected to be. This can mean that an incorrect data byte has been sent, that the UART is set for the wrong parity, or that the parity bit itself is wrong.

Framing errors occur when the stop or start bits of a data byte seem to be in the wrong place. This can happen because the UART was interrupted, or because of a bad data byte.

Overrun errors occur when characters are missed because the CPU did not get the old data from the UART before new data came in. This usually is because the computer is trying to do too many things at once, or too fast. If you type on the keyboard at the exact same time data is being received, this will often cause an overrun error since the computer missed the incoming data while processing your key. At the higher baud rates this happens more frequently because there is less time between characters.

It's normal to get a few of each of these errors when using OMNITERM with any communications line that is subject to noise. Most errors do not indicate bad data, but only that the UART thought the data strange. If you get less than 20 errors in each hour, you probably needn't worry. If you get hundreds, your UART is probably set incorrectly. The main purpose of these counts is just to give you a general idea of the quality of your communications.

Appendix F - OMNITERM Speed Limits

Since the CPU of the TRS-80 is limited in speed, OMNITERM can only handle communications up to a certain rate without falling behind and missing characters. Although OMNITERM allows you to configure your UART for any baud rate up to 19200, this does not mean that OMNITERM can take data transmitted continuously at that rate. This means only that the interface hardware can take in the individual bits in each byte at that rate. OMNITERM needs a certain amount of time at the end of each line to scroll up the screen. OMNITERM also needs some time, although less, between each character. Only at very high baud rates does this become a problem.

OMNITERM can handle continuous data at any speed up to 600 baud without any special needs. To go beyond this speed, OMNITERM needs what are known as Nulls at the end of each line. Null characters are time units of the same length as a character that are sent at the end of each line to allow the screen to scroll up. Nulls were originally used with mechanical printer mechanisms that needed time after each line to move the print head back to the beginning of the paper. The number of nulls needed after each line at various baud rates is shown below.

Baud Rate	# of Nulls	Baud Rate	# of Nulls
50	0	1200	1
75	0	1800	2
110	0	2000	3
134	0	2400	4
300	0	3600	6
600	0	4800	8

Up to 3600 baud OMNITERM, if it gets at least the proper number of nulls, can do everything as described in this manual. At 4800 baud, OMNITERM only has enough time to do the basic functions of translating bytes and sending them to the correct devices. If you try to run the printer or do file I/O at a full 4800 baud with no pauses between characters, OMNITERM will not be able to keep up.

Beyond 4800 baud, OMNITERM cannot keep up at all with full speed. Although you can configure your UART for 7200, 9600 and 19200 baud, you should not run OMNITERM at these rates unless there is some wait time between characters. For instance, when you type on the keyboard, there is a long wait between characters and OMNITERM could keep up with this, or even something a great deal faster, at up to 19200 baud. Just do not try to run at these speeds with no wait time between characters.

Appendix G - OMNITERM Setting File (/OMT) Contents

When you save OMNITERM's Settings with the S system command, the file that is created has the following contents:

Name	# of Bytes	Description/Use
MCCTLW	1	Microconnection Control Word
INTTYP	1	Interface Type: 0=RS-232, 1=MICRO
CTSFLG	1	1=CTS Wait, 0=CTS Ignore
LFFLG	1	1=LF Ignore, 0=LF Honor
REFORM	1	Screen Reformat Value
UIMAGE	1	UART Status Image
PRFLG	1	1=Printer ON, 0=Printer OFF
ECHFLG	1	1=Echo ON, 0=Echo OFF
DUPFLG	1	1=Duplex HALF, 0=Duplex FULL
CRFLG	1	1=CR Suppress, 0=CR Honor
CRLFGF	1	1=CR/LF Grouping ON, 0=OFF
UBDSTO	1	Baud Rate Image
DKIFLG	1	1=Disk Input ON, 0=OFF
DKOFLG	1	1=Disk Output ON, 0=OFF
SIGLEN	1	Signon message length
MSIGST	63	Auto Signon message
KITBL	256	FROM Keyboard translation table
DKTBL	256	FROM Disk translation table
CLTBL	256	FROM Comm Line translation table
DOTTBL	256	TO Display translation table
CLTTBL	256	TO Comm Line translation table
DKTTBL	256	TO Disk translation table
PRTTBL	256	TO Printer translation table
CMDTBL	256	Special Command table
CMDADR	80	Special Command Address table
CTLTBL	256	Control Key Table

Appendix H - Connecting an Amplifier for the Bell

To hear the BEEP sound caused by special command number 2, Bell, you must connect an audio amplifier to the cassette output port of your TRS-80. The easiest way to do this is to buy an audio amplifier, such as that sold by Radio Shack for about $13 and connect it to the audio output from your computer. Other methods include modifying your cassette recorder, or connecting a speaker to the EAR jack on the cassette recorder and putting the recorder into RECORD mode with no cassette by holding in the tape feeler inside the recorder.

In any case, you should hear a BEEP sound when a control-G is received. To test it, put OMNITERM into Half DUPLEX and press control-G on your keyboard (down arrow and G). This should both make the BEEP and cause the picture of the bell to flash on the screen.

If you do not connect the speaker or audio amp to the cassette port, OMNITERM will still flash the picture, but no BEEP will be heard.

Appendix I - BINERR/ERRBIN Format

When BINERR/CMD is run, the output format consists of lines of ASCII characters with values ranging from 32 decimal (an ASCII space) to 95 decimal (an ASCII underscore). This makes a total of 64 possible characters, or 6 binary digits worth. These are created from 6 bit data by adding an offset of 32 to the original data, so that the resulting ASCII characters will be numbers, symbols, and uppercase letters, all of which are printable. Since these characters are the most commonly used in the ASCII set, they are not normally translated or manipulated by timesharing computer systems, and can be safely stored on them. In the following discussion of the contents of these lines, we will assume that the offset of 32 decimal is not present (has not yet been added, or has been subtracted) on each of the bytes.

The first byte is the number of 8-bit data bytes encoded into the line. This can range from 0 to 63 and will be referred to as the NOB (Number of Bytes). If it is 0, this indicates the End Of File (EOF) and is treated differently.

After the NOB comes the data itself, encoded into records of 4 bytes each. Each set of four bytes (storing 6 bits of data each) holds 3 bytes of original 8 bit data. Only the last record in the file may hold less than three data bytes, in which case the remaining empty bits are 0, and the NOB byte is not a multiple of three. Each record is treated as a string of 24 bits, into which the 24 bits of three 8-bit original data bytes are simply packed in sequence. This continues for as many records as are needed to fill out the NOB. Normally this will be for 39 bytes, or 13 records. It can be other lengths as specified in the NOB, but 13 records makes for a total line length of 55 bytes which seems easy to work with.

After the records comes a checksum of all the record bytes in the line. This takes two bytes in the formatted line, and so is 12 bits (MSB,LSB). It is the 12 least-signifgant-bits of a 16 bit checksum of the actual bytes as placed in the data records, including the offset of 32 decimal. The higher 6 of the 12 are in the first byte and the lower 6 in the second.

At the end of the line is a carriage return, followed by as many more lines as are needed to finish the file. Normally the last line will have less than 13 records, and in 2/3 of the cases one or two bytes of the final record will be unused.

After the final line of data comes a line whose first byte is a space (meaning there are 0 data bytes in the line because the ASCII value of space, minus 32, is 0) followed by a two byte checksum in the same format as the checksums at the end of each line. This checksum however is a sum of all previous checksums only.

Appendix J - Trademark Acknowledgments

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If we have left out anyone here, we apologize, as it is purely unintentional. Please let us know and we will correct it as soon as possible.

Appendix K - Special Printer Drivers

This section is meant only for those with a good background in machine language programming. If you do not have this background we suggest that you ignore this information, as users not wishing to use unusual printer drivers will not need it.

OMNITERM sends all text going to the printer through the *PR system device. This means that special drivers for serial printers, special print formatting, etc., will work easily with OMNITERM.

The requirement for use of a different *PR driver is that it must follow the convention of returning the printer status when a 0 is sent to the *PR device. Whenever a 0 is sent out, the driver should return a byte with bit 7 set high if the printer is busy or the driver will not return immediately if a byte is printed. OMNITERM will wait for bit 7 of this byte to go low before sending data to the printer. If the driver you wish to use does not do this, OMNITERM will either never send data to the printer (bit 7 always high) or will send data to the printer even when a pause will result (bit 7 low). This would result in OMNITERM missing incoming data over the communications line while the printer driver is waiting.

OMNITERM will use the standard *PR printer device ONLY if that device's address (as stored at 4026-4027 Hex) is in RAM space above 4000H. If the *PR device is pointing to the routine in ROM, then OMNITERM will use its own driver instead. This is done because the Model III ROM driver does NOT follow the convention of returning printer status when sent a 0.

Appendix L - How to add your own Special Commands

This section gets into the technical innards of OMNITERM. It is meant only for those with a reasonably strong background in machine language programming. No attempt will be made to define unfamiliar phrases or concepts. If you do not have this background already, it is probably best to ignore this information.

This information, while correct in concept for all past and all likely future versions of OMNITERM, gives addresses correct only for OMNITERM version 1.52. In any future version they WILL change, without doubt, so be sure to check any addendums you may have for your version of OMNITERM. Also, while there is room for additional special commands at this point, as new special commands are added in future versions there may well be less space available for user use. Therefore this information is given on a strict at-your-own-risk basis. Several OMNITERM users have indicated that they would like to add their own special commands for a specific application. This information will allow you to do that, but be aware that any routines written to work with OMNITERM version 1.52 will have to be re-assembled at the least to work with future versions of OMNITERM. If you choose to give your special command a number which is the same as a future standard OMNITERM special command, you may have to change this as well.

OMNITERM Load & Run-time addresses

The first thing that must be known about OMNITERM is that it loads at 6000H and then moves itself down to 5200H for execution. All addresses are based on the OMNITERM run-time base address of 5200H, and not 6000H. It is important to be sure that when you modify OMNITERM's Special Command table, you do it while OMNITERM resides at 6000H (so you can write it back to disk), but to modify the bytes E00H higher than those mentioned in this text, since the run-time addresses are mentioned, not the load addresses.

The usual procedure for adding code onto the end of a program is to load the program, then load the additional code into RAM, and then DUMP it off to disk. This will not work with OMNITERM because OMNITERM uses all the space directly above it for buffer storage. Instead, you must place your routines in high memory, and then lower HIGH$ (also called HIMEM, at 4049H in the Model I, 4411H in Model III) appropriately. OMNITERM will respect space above HIGH$.

How OMNITERM processes Special Commands

As described elsewhere, each time OMNITERM processes a byte it runs it through the appropriate FROM table and then checks it against the Special Command table. The Special Command table, CMDTBL, is part of the OMNITERM setting file whose contents are described in Appendix G. The entire setting file is loaded sequentially by OMNITERM at 7B1FH. This makes CMDTBL start at 826DH. Bytes are checked through CMDTBL by adding the value of the byte as an offset to CMDTBL. Thus the Special Command number of any special command assigned to capital A, 41H ASCII, would be at 826DH plus 41H, or 82AEH. CMDTBL can be modified by the OMNITERM user from within OMNITERM. If the contents of this offset byte is zero, then no special command is executed and OMNITERM continues normally.

If the contents are non-zero, then this value, the Special Command number to be executed, is doubled (to make room for a two-byte address in CMDADR), and then added to the address of CMDADR, the Special Command Address Table, located at 836DH. The resulting sum is the address of a two-byte pointer to the routine that should be executed to do the Special Command. This routine is NOT a subroutine, and is jumped to, not called.

To summarize, the value of the processed byte is added to CMDTBL at 826DH, and the byte at that address is fetched. If zero, nothing happens. If non-zero, the byte is a Special Command Number and is doubled and added to CMDADR at 836DH. The resulting sum is the address of a two-byte pointer stored in standard Z-80 format, which is the address of the routine that executes the Special Command. This address is then jumped to.

User Special Commands

At this point the user's routine would take over, do its thing, and then return to OMNITERM with a JP, not a RET. The user will have to pick a Special Command number for his routine. It should be greater than 31, since 31 is the highest Special Command number used by OMNITERM 1.52. However, it should not be greater than 39, since only 80 bytes are allocated to CMDADR, and any Special Command number greater than 39 would index to an area outside of CMDADR. So the only change the user would have to make to OMNITERM itself would be to place an entry in CMDADR pointing to the address of his routine.

Re-entry to OMNITERM

After execution of the user's routine, it should return to OMNITERM. There are only three recommended re-entry points to OMNITERM. They are MINPUT at 564BH, MBYTE at 566FH, and MBACK at 5674H.

MINPUT

At MINPUT the contents of all registers is irrelevant. OMNITERM will check all input devices for characters, and continue from there. This re-entry point is used when the processed original byte (that caused entry to the user's Special Command) is to be ignored and not sent to any device by OMNITERM. Of course, the user's routine may well have done something with this byte, but that is not OMNITERM's concern. This re-entry point is used, for instance, by OMNITERM Special Command number 1, Break. This re-entry point is used because the (by default) control-A that caused the True Break to occur is not to be sent out as a control-A, but is simply used to trigger the function.

MBYTE

At MBYTE, OMNITERM will assume that a byte has been received and processed through the appropriate FROM table, but has not yet been checked against the Special Command table. It will proceed to do this, and go on from there. Register A should have the byte that OMNITERM has supposedly just received from the FROM table. Register IX should contain a 0 if OMNITERM is supposed to think the byte came from the comm line, a 1 if the byte supposedly came from the keyboard, and a 2 if it supposedly came from the disk buffer. All other registers are ignored. This re-entry point is not used by any current OMNITERM Special Command, but it is available for your use.

MBACK

At MBACK OMNITERM will assume that the byte has already been processed through the Special Command table, and any Special Command function to be executed has already been done. This is the most commonly used re-entry point. Register B (not A) should contain the data byte, and register IX should be as above. All other registers are ignored.

OMNITERM Memory Map

Here is a list of the major storage areas of OMNITERM. The addresses are for version 1.52 only. You will probably want to use some of these in your own routines.

Address	Name	Function
564B	MINPUT	RE-ENTRY POINT
5674	MBACK	RE-ENTRY POINT
566F	MBYTE	RE-ENTRY POINT
7AD6	PRBUFF	NEXT BYTE TO PRINT
7AD8	PRNEXT	NEXT BYTE TO BUFFER
7ADA	PRBOTT	BOTTOM OF PRINT BUFFER
7ADC	DSPBOT	BOTTOM OF DSPBUF
7ADE	DSPNXT	NEXT BYTE TO BUFFER
7AE0	IOTOP	NXTBYT HERE (= EMPTY)
7AE2	PROMPT	PROMPT STORAGE
7AF2	LAST16	LAST 16 CHARS REC'D
7B02	PRMLEN	LENGHT OF PROMPT
7B03	PROMW	WAIT FOR PROMPT ON/OFF
7B04	OUTIME	MAX TIMER VALUE
7B05	OUTWAT	CURRENT TIMER VALUE
7B06	IONEXT	NEXT BYTE TO SEND
7B08	LSTCHR	LAST CHARACTER SEEN
7B09	LSTREM	LAST REMOTE CHARACTER
7B0A	LSTLOC	LAST LOCAL CHARACTER
7B0B	LSTKEY	LAST KEYBOARD CHARACTER
7B0C	CHRMDE	MODE 0=64 CPL, WIDCHR=32
7B0D	LBTEST	LAST BREAK KEY TEST
7B0E	RPTCTR	REPEAT COUNTER
7B0F	DOSTO	OLD *DO DCB STORAGE
7B11	PRSTO	OLD *PR DCB STORAGE
7B13	SIGLFT	# OF AUTO-SIG BYTES UNSENT
7B14	UPARTY	PARITY ERROR COUNT
7B16	UOVERN	OVERRUN ERROR COUNT
7B18	UFRMNG	FRAMING ERROR COUNT
7B1A	SCNFLG	SCAN FLAG FOR KISCAN
7B1B	CURBUF	CURSOR ADDR STORAGE
7B1D	TOPRAM	HIGH$ STORE (I OR III)
7B1F	/OMT File starts with MCCTLW as described	in Appendix G
83BD	/OMT File ends with CTLTBL as described	in Appendix G
84BE	CMDBUF	TEXT BUFFER
84FD	CBUF	STORE SCREEN HERE IN C-MODE
88FD	DSKBUF	DISK FILE BUFFER
89FD	DSKDCB	DISK DCB
8A2F	IOBOTT	LOWEST USABLE I/O BUFF BYTE

From 8A2FH onward, RAM is dedicated to I/O and other buffers, up through TOPRAM.

Appendix M - RS-232 Signal Conventions

In order to eliminate confusion, for the purposes of OMNITERM and this manual, the RS-232 signal conventions that we use are as follows:

When OMNITERM, or this manual, says an RS-232 control line is ON, this means that a binary 1 has been written to, or read from, a UART port bit. This also means that the line is LOW, or set to a negative voltage.

When OMNITERM, or this manual, syas an RS-232 control line is OFF, this means that a binary 0 has been written to, or read from, a UART port bit. This also means that the line is HIGH, or set to a positive voltage.

Appendix N - How OMNITERM dials the Telephone

OMNITERM uses the RTS control line to dial the telephone. Simply put, OMNITERM uses the Microconnection standard method for dialing the phone, where the phone line is off-hook when RTS is low (ON), and on-hook when RTS is high (OFF). OMNITERM simply brings the RTS line high for 62 milliseconds, and then low for 38 milliseconds, once for each click within a digit. It then waits 500 milliseconds with RTS still low (off-hook) for the between-digit period, and then continues with the next digit. When all digits have been dialed, OMNITERM returns the RTS line to the state it was set to when dialing was started. Normally this is ON (off-hook).

Glossary

<BREAK>
The BREAK key on the TRS-80 Keyboard.

<ENTER>
The ENTER key on the TRS-80 Keyboard.

Access
To access a function is to use it, to get at it and to execute or do it.

Acoustic Coupler
A type of modem that connects to the telephone by placing the handset in two rubber cushions so that the sound gets to and from the phone without any direct electrical connection to it. See also Modem.

Alt Mode
See ESCAPE.

ASCII
American Standard Code for Information Interchange. The communications code that the TRS-80 and most other computers use to transfer data. See the Appendix.

Baud
A measure of the speed of transmission of data. The baud rate tells how many bits per second are sent, although not all the bits contain data, since some of them are start, stop and parity bits. See also Bit.

Bit
The fundamental unit of information, a bit (binary digit) is a single 1 or 0 signal, a Yes or a No. There are 8 bits in a byte. See also Byte.

Boot
Boot is short for bootstrap, as in "to pull oneself up by one's bootstraps". It describes the process by which a computer or a computer program starts itself up. To boot a computer or program is to start it.

Break
See True Break.

Buffer
A storage area for information in the computer's memory. Data comes out of the buffer in the same order that it went in, so buffers are used for storing data that will not be processed immediately. OMNITERM has three main buffers, the Disk I/O Buffer, used for file transfers, the print buffer, used for holding characters the printer has not had time to print yet, and the scroll back buffer, which holds information that has scrolled off the top of the screen.

Byte
A unit of memory storage. A byte is eight bits in size and can hold any whole number value from 0 to 255. Normally, one byte will hold one character of data. See also Character, Data Word, Bit.

CR
Short form of Carriage Return.

Carriage Return
A character with an ASCII value of 13, that is meant to cause the carriage of a Teletype or other printing terminal to return to the left side of the page. On the TRS-80, this causes the cursor to move to the beginning of the next line. See also Character, Data Word, Byte.

Character
Any single letter, number, punctuation mark, etc. that can be typed from the keyboard, put on the screen, or sent over the comm line. See also Data Word, Byte.

Comm Line
Communications line. The hardware interface that OMNITERM uses to connect with other equipment. See also RS232C Interface.

Command
Any action that causes OMNITERM to do something special. See also Function.

Configure
To change something, either hardware or software, to make OMNITERM act differently. To configure OMNITERM is to set it up so that it will do what you want it to do. For example, when you change the translation and special command tables for use with a particular computer, you have configured OMNITERM for that computer.

Control Key
The Down Arrow key on the TRS-80 keyboard. If another key is pressed while the control key is held down, the key will be sent through the Control Key table after going through the FROM Keyboard table. It's used to send special characters not already on the TRS-80 keyboard. See also Character, Byte.

CPU
Central Processing Unit. The essential part of a computer that runs programs and controls the rest of the computer. Often used as a shorthand way of saying "the computer".

Cursor
A small white block on the screen which is in the spot where the next character on the screen will be printed.

DOS
Disk Operating System. The program that loads in other programs, runs the disk drives, takes DIRectories, etc. Some common disk operatings systems for the TRS-80 are TRSDOS, NEWDOS and VTOS.

Data Word
A character as sent over the comm line. It consists of a character up to 8 bits in length, together with start, stop and parity bits, as sent by the UART. See also Byte, Character, Bit.

Dec
Short for Decimal.

Decimal
The usual numbering system used in everyday life. Decimal numbers are in base 10 and use the digits 0,1,2,3,4,5,6,7,8 and 9. See also Hex.

Default
The way things work if you do not specify otherwise. OMNITERM has default values for all functions and if you do not change them, they are what OMNITERM will use.

Disk I/O Buffer
The Input/Output buffer that OMNITERM uses to store information going out over the comm line or coming in over the comm line. This buffer can be loaded from a disk file and its contents can be saved to a disk file. See also Buffer.

Display
The video screen where information is shown.

Dumb Terminal
Sometimes called a glass Teletype. A dumb terminal is a device that simply displays on its screen everything sent to it, and sends each key as it is pressed. It has no functions more advanced than that.

Duplex
Can be either Half or Full. Half Duplex means that characters sent from OMNITERM are not echoed by the remote system and so OMNITERM must directly place these characters on the display itself. Full duplex means characters sent from OMNITERM are echoed back and OMNITERM need not send them to the display, since they will go there anyway when OMNITERM receives their echos.

Echo
To echo characters is to send back out everything that is received. OMNITERM can do this if remote machines need it and many timesharing systems will do this for OMNITERM so you can use Full Duplex. See also Character, Duplex.

ESCAPE
An ASCII code with a value of 27 that is usually used to precede a special sequence of bytes that perform some special function. By default, you can type an ESCAPE by pressing the Up-Arrow key on the TRS-80 keyboard. See also Escape Sequence, Character, Byte.

Escape Sequence
A special series of characters that are preceded by an ESCAPE and perform some special function. See also Character, ESCAPE.

Execute
To do a function, run a program, or perform some action.

Filename
The name by which a disk file is referred. In standard TRSDOS format the filename is 8 characters, a slash, a 3 character extention, a period, an 8 character password, a colon and a disk drive number. All but the original 8 characters are optional and all may be shorter than their maximum length. Also

called a Filespec, or file specification. See also Character.

Filespec
See Filename.

Flag
An indicator that shows the state of something. See also Status Flag.

Full Duplex
The process where one computer echos all the characters the other sends. See also Echo, Duplex.

Function
Any action OMNITERM can take. Can be done by pressing a key, or processing a byte. See also Command.

HIMEM
A DOS memory location that stores the location of the last usable byte of memory. OMNITERM uses this to determine where its disk I/O buffer must end. If this value is changed correctly by other drivers you wish to use with OMNITERM, there will be no conflict between them. In the Model I, this is at 4049H. In the Model 3, at 4411H. See also Byte, Hex.

Half Duplex
The process where neither computer echos bytes to the other. Instead, each assumes the duty of displaying the characters it sends locally.

Hex
The base 16, or hexadecimal number system. Used often when working with computers because four bits, exactly half of a byte, fits into one Hex digit. Thus a byte in Hex is always two digits, of 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E and F, corresponding to the decimal numbers 0 through 15. Most high school math books explain the basis of place-value numbering systems and will teach you how to work with different bases. See also Decimal.

I/O Buffer
See Disk I/O Buffer.

LSTCHR
The location in memory where OMNITERM stores the last character it processed, previous to the current one.

LSTKEY
The location in memory where OMNITERM stores the last key that was typed.

LSTLOC
The location in memory where OMNITERM stores the last character generated locally from the keyboard or from the disk I/O Buffer.

LSTREM
The location in memory where OMNITERM stores the last character it received over the comm line.

LF
Short form of Line Feed.

Line Feed
An ASCII character with a value of 10 that is meant to cause the paper on a Teletype to move up to the next line. On the TRS-80, this character causes the cursor to go to the beginning of the next line.

Menu
A list of choices, from which you can pick one. Like a restaurant menu, menus are used by OMNITERM to give you a list of possible functions and allow you to choose among them.

Modem
A device that connects to your RS-232C interface and a telephone that translates the electrical pulses sent out over the interface into tones that are sent over the phone network so you can send data over long distances. The modem can also translate those tones back into pulses so it can receive data sent by another modem elsewhere. Most popular modems run at 300 baud, with a few as fast as 1200 baud. Modem stands for Modulator/Demodulator. See also Acoustic Coupler.

Page
Sometimes OMNITERM will refer to a page. This just means that you can fill the screen with other data which is considered another page of data.

Parity Bit
A bit that can be added to each data word to make the sum of the bits that are 1 in each word either an even or an odd number. This is used for error checking. See also Bit, UART, Data Word.

Print Buffer
The buffer that OMNITERM uses to store characters going to the printer that have not yet been printed. It is 2048 bytes in length. See also Buffer.

Prompt String
A series of characters that tell OMNITERM that it can transmit another line of text. See also String, Character.

RS-232C Interface
This is the hardware that connects your computer to outside equipment, and forms your comm line.

Screen
See Display.

Scroll
When the TRS-80 moves all the lines on the screen up one line, this is called scrolling the screen. This takes a certain amount of time to do, so at very high baud rates OMNITERM needs extra time at the end of each line.

Special Character
Any character not on the standard TRS-80 keyboard, such as the broken bar, tilde, square brackets, etc.

Start Bit
The bit at the beginning of each data word that marks the start of the word.

Status Flag
An item of data in OMNITERM's command mode that shows the current state of a particular function. Status flags tell you exactly how OMNITERM is configured at any given time.

Stop Bit
The bit or bits that mark the end of each data word. These bits last until the next word is sent, which may be an extremely long time. There will always be at least the number of bits set for Number of Stop Bits in the UART.

String
A series of characters one after another. In a string, or line of characters. See also Character.

Timesharing
When one large computer has many people using it at the same time, this is called timesharing, since the computer's time is shared among many users.

Toggle
To toggle something is to change the status of something that has only two states. If it is on, you can "toggle" it off, and if it is off when you "toggle" it, it will go on.

True Break
A true Break is a sort of extended 0 signal sent over the comm line that is usually used to get the attention of the computer connected to the comm line. In OMNITERM, the <BREAK> key on the keyboard will by default send a true Break.

UART
Universal Asynchronous Receiver Transmitter. The device in the RS-232C interface that serializes the data sent to it and attaches start, stop and parity bits to it. The UART also does the opposite of this operation when receiving data.

Wrap Around
When a word is printed at the end of the screen, the first letters will be on the line it started on, but the last ones will be at the beginning of the next line. This is called wrap around, because the words wrap around the edge of the screen.

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